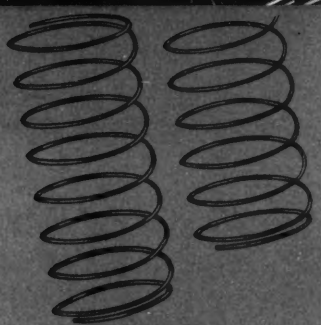
WIRE AND WIRE PRODUCTS

MARCH 1944

BULLET CORES *today*—

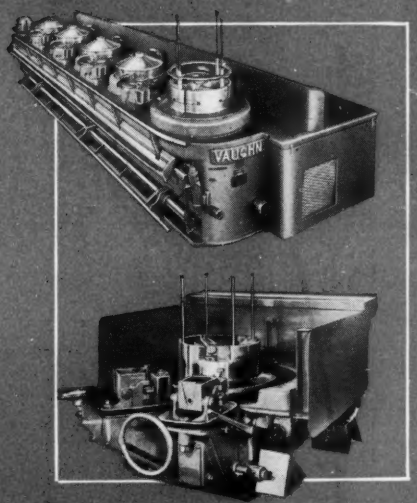
LUXURY SPRINGS *tomorrow!*



VAUGHN *Versatility*

MAKES CONVERSION EASY!

After Victory, wire manufacture will turn from the stern needs of war to the gentler applications of peace . . . and, in your wire drawing equipment, *versatility* will become a major competitive advantage. Flexible versatility is one of the great performance features of Vaughn Motobloc and Motoblox . . . assuring prompt conversion for new markets and new profits!

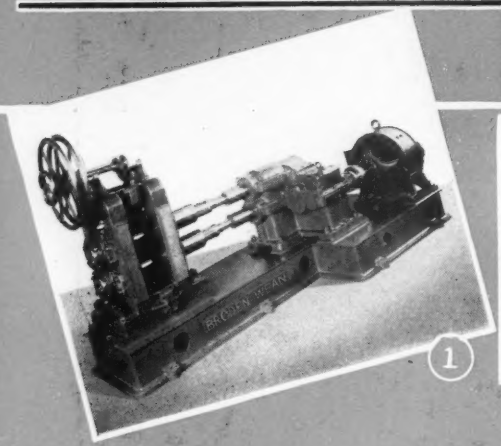


THE VAUGHN MACHINERY COMPANY
Cuyahoga Falls, Ohio, U.S.A.

COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

WEAN-BRODEN



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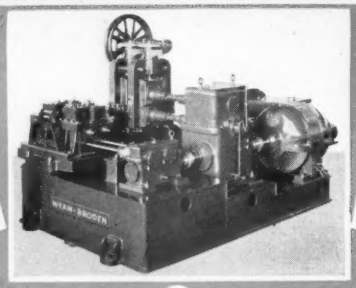

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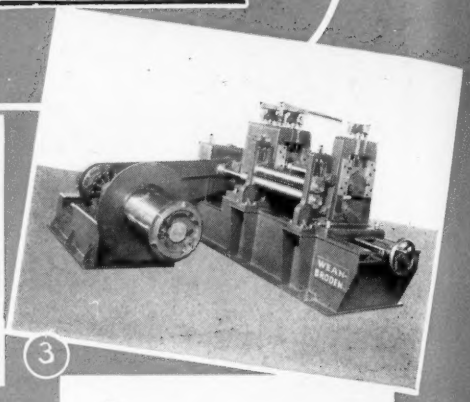

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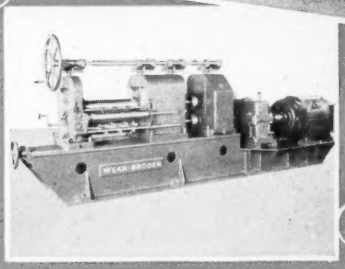


4

1. Small Cold Rolling Strip Mill
2. Special Strip Cold Rolling Mill
3. Strip Reel and Slitting Unit
4. Heavy Duty Slitter
5. Special Alloy Single Draft Heavy Duty Vertical Wire Drawing Block for 5/8" Round Rod

THE Wean Engineering Company, Inc., have long been recognized as Specialists in sheet, strip and tin mill equipment. . . . The Broden Construction Company specializes in the manufacture of narrow strip and wire mill equipment.

With the extended facilities of The Broden Construction Company as a subsidiary of The Wean Engineering Company, Inc., it is now possible to serve the steel industry more effectively.

COLD ROLLING MACHINERY

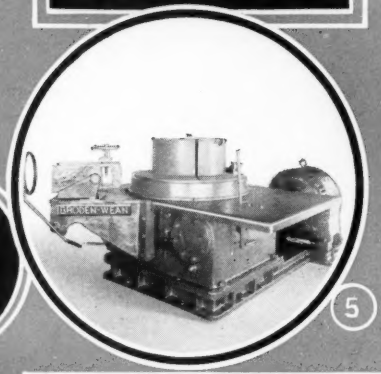
For 36" Wide Material and Narrower

Mills • Reels • Slitters • Levelers • Coilers • Edgers
Scale Breakers • Shears • Scrap Ballers
Continuous Pickling

WIRE MILL EQUIPMENT

Wire Drawing Machines • Patenting • Galvanizing and Tinning Take-Up Frames • Wire Flattening • Spoolers
Nail Galvanizing and Blueing

HOLMQUIST BARBED WIRE and WIRE FENCE MACHINERY



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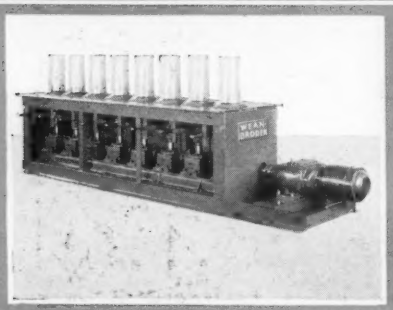
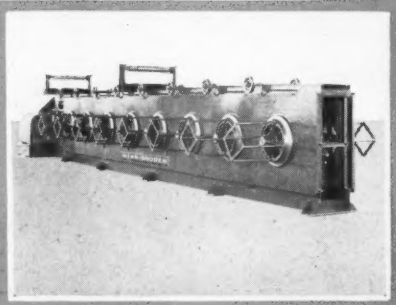
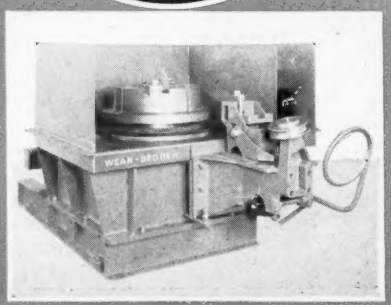
The BRODEN CONSTRUCTION Co., Inc., Cleveland, O.
A SUBSIDIARY COMPANY OF
The WEAN ENGINEERING Co., Inc., Warren, O.



FINE WIRE TINNING UNIT



MULTIPLE WIRE TAKEUP FRAME



TWO DRAFT CONTINUOUS WIRE DRAWING MACHINE

TOP PERFORMANCE! MAXIMUM ECONOMY!

. . . ON ALL YOUR CARBIDE SHAPE DIE REQUIREMENTS!

WHEN you draw shape wire or bar through Carboloy Dies you get surface finish of an unusually high order —practically mirror-like in quality; uniform size throughout the entire length of coil; and accurate maintenance of all contours, including sharp, or controlled-radius corners when desired.

For *maximum* economy and convenience with carbide dies on this type of work, try this three way plan for *all* your carbide shape die requirements: (1) Obtain standard Carboloy squares and hexagons rough cored, and finish in your die room. (2) Obtain large special dies rough shaped close to size—ready for rapid finishing. (3) Use standard round hole Carboloy Dies for small special shapes by quickly converting from round to shape required.

Complete Carboloy-developed equipment and training service—including special factory training course—available to assist mills in getting these maximum economies on shape wire and bar work.

CARBOLOY

TRADEMARK

CEMENTED CARBIDE SHAPE DIES

STANDARD SQUARES AND HEXAGONS . . . ALL TYPES OF SPECIALS ROUGH SHAPED CLOSE TO SIZE

Carboloy Company, Inc., Detroit, Michigan

Birmingham · Chicago · Cleveland · Los Angeles · Newark · Philadelphia · Pittsburgh · Seattle · Thomaston, Conn.

Authorized Distributors: Hartley Wire Die Co., Thomaston, Conn.; Michigan Wire Die Co., Detroit, Mich.

★ *Production for them and their brothers in service* ★

The American Brass Company, famous name in brass, in producing tubing for ship condensers overcame a difficult lubrication problem with a Shell Industrial Lubricant.

S-T-R-E-T-C-H-I-N-G BRASS

A SOLID, CAST, BRASS BILLET is perforated and stretched 25 times its original length and becomes a flawless length of seamless tubing for a ship's condenser. The condensers of a Victory ship often require as much as 16,000 pounds . . . over 7 miles of tubing!

With 19,238,626 dead weight tons of shipping delivered in 1943, you can readily visualize the vast quantities of tubing vitally needed for the condensers of new ships alone.

Shell contributes to The American Brass Company production by supplying the Industrial Lubricant that makes it possible to work brass into condenser tubing.

To take a 2-foot billet of tough, solid brass and transform it into 50 feet of thin-walled tube involves tremendous force and friction. Before each of the series of drawing operations, which are performed cold, tube blanks, or tubes, are dipped into Shelldraw Compound.

Shelldraw Compound not only prevents metal-to-metal contact, but because of its unique cooling properties eliminates excessive expansion of both die and tubing. Size tolerances are maintained, die wear is reduced, finish is superior. As war production sets new records, proper lubrication becomes even more vital. Yesterday's solution is seldom good enough for today.

Are you sure your plant has the benefit of all that is new in lubrication as it develops? Ask a Shell engineer.

SHELL

Leaders in War Production rely on

SHELL INDUSTRIAL LUBRICANTS

There's more than just steel wire here . . .

Whether you're a large user of wire, accustomed to ordering by the carload, or buy merely in small lots, we stand ready to give you dependable consultation service. Our metallurgists and laboratories have licked many tough wire problems, and are ready to cooperate in determining and meeting your needs.

In selecting the type of wire required we give careful consideration to the way in which it is to be used. You get the benefit of personal attention, long years of experience with all types of wire application problems—including formula of steel, tempering procedure and finish which will serve you best. Every detail is checked to assure a high performance level at low cost.

That specific type of service, plus constant research and pioneering, has resulted in 123 years of steady growth. And because we operate our own blast furnances, open hearths and wire mills—and control production from ore to finished product—you may be certain of uniform high quality.

You'll get what you need here at wire headquarters: high and low carbon steel wire, round, flat or shaped, in a variety of sizes, tempers and finishes. Put your wire problems up to experts.

Send your wire questions to

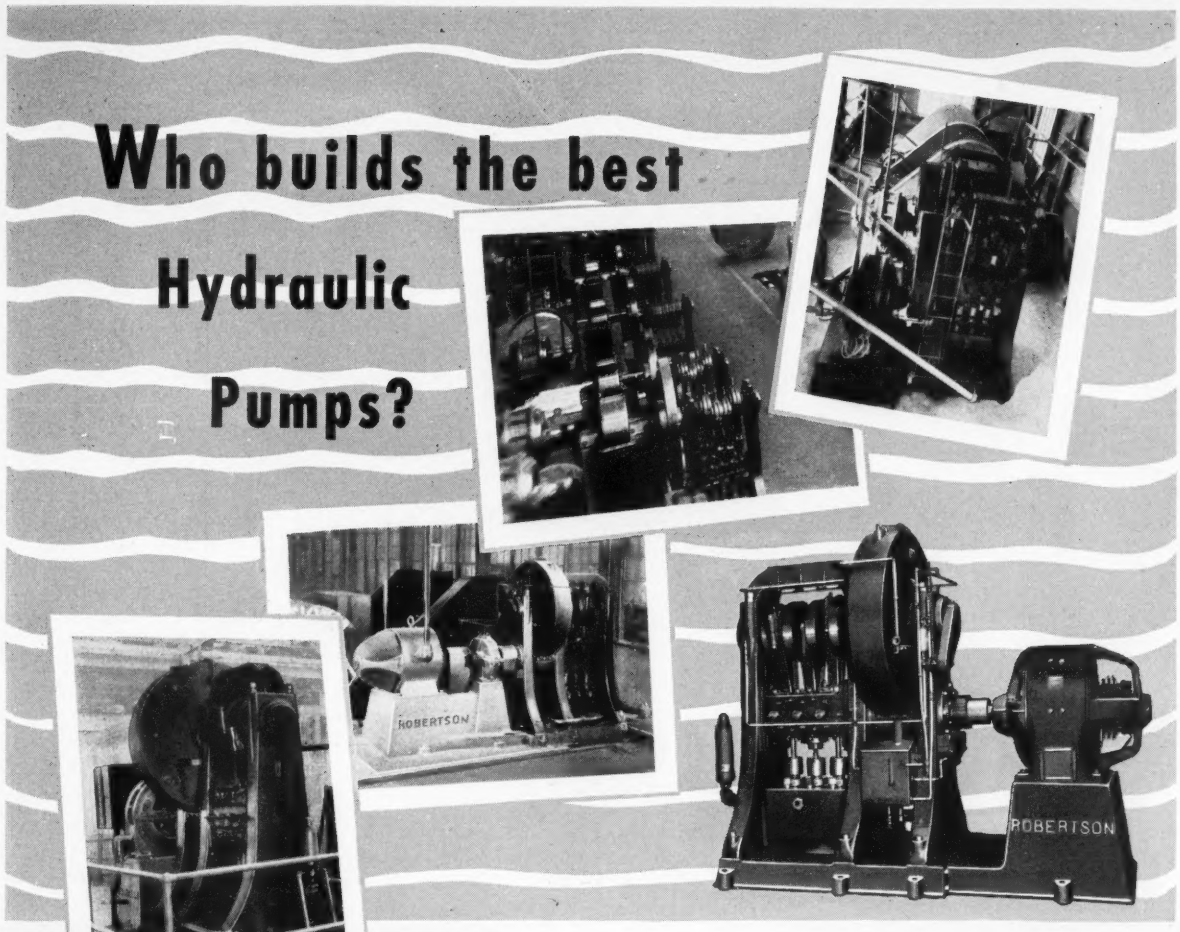
WICKWIRE SPENCER STEEL COMPANY

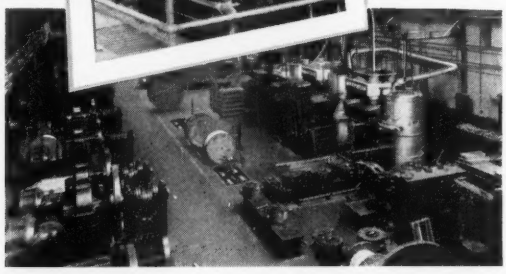
500 FIFTH AVENUE, NEW YORK (18), N. Y.

Abilene, Buffalo, Chattanooga, Chicago, Detroit, Houston, Los Angeles, Philadelphia, San Francisco, Tulsa, Worcester

WS STANDS FOR FRIENDLINESS

Who builds the best Hydraulic Pumps?





FIRST CHOICE *for* all *cable lead encasing equipment, among all cable makers, is Robertson. Robertson presses, die-blocks, operating valves and closed lead melting pots, as well as hydraulic pumps, make complete installations in the plants of the* majority *of cable manufacturers.*

ANSWERING YOUR QUESTIONS *about the construction and operating details of Robertson Pumps and complete Cable Lead Encasing Equipment, these two fact-packed bulletins will be sent free upon request on your letterhead. Write for them* NOW; *there's no obligation whatsoever.*

Free!

WE LET Robertson High-Pressure Hydraulic Pumps "speak for themselves." Which they do very well. For—to the engineer, even a cursory survey of the construction advantages of Robertson Pumps foretells the operating economy and endurance which are their outstanding characteristics in the eyes of production executives.

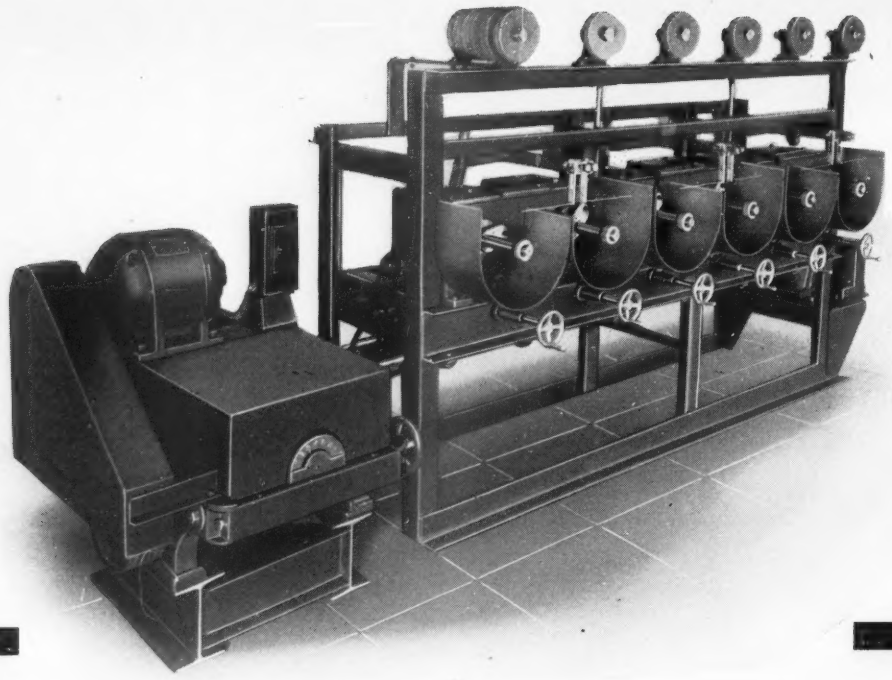
As a result, a majority of the leading makers of lead encased cables in the United States and Canada have chosen Robertson Pumps—and, very apparently, have had their judgment fully supported, for they have re-ordered again and again over periods of years!

Robertson
COMPANY INCORPORATED

125-135 WATER STREET, BROOKLYN 1, NEW YORK

Designers and Builders of all Types of Lead Encasing Machinery

Since 1858



Syncro gang type Take-ups and Re-spoolers for your *Tinning and Re-spooling* operations

The Syncro gang type take-ups and respoolers can be furnished in any desired multiple of units, either single or double side. The machine shown is the six reel, single side type, for reels weighing up to 100 pounds loaded. Similar machines can also be furnished for reels weighing up to 500 pounds loaded.

The arbor speed of these machines is constant and variable through their transmissions. The machines can also be equipped for capstans to provide constant wire speed.

Individual clutches provide smooth starting of each separate reel unit. The fixed stroke master distributors have simple provisions for variable pitch lay. Each reel unit is self contained and mounted in an individual enclosed housing. Write for complete details.

SYNCRO MACHINE COMPANY

RAHWAY, NEW JERSEY
McCORMICK BLDG., CHICAGO

REPRESENTED IN CANADA BY CANADIAN ELEVATOR EQUIPMENT CO. LTD., TORONTO

Machinery for the Wire Industry

SYNCRO

STANDARD INDUSTRIAL COMPOUNDS

Seventy Series

WILL SOLVE TOUGH DRAWING PROBLEMS FOR YOU

WHILE we continue to make Formula No. 70 for Stainless Steel, as announced in the December '43, issue of Wire & Wire Products," Page 758, we have found that by using the base formula and changing the combination of ingredients we obtain special properties to meet certain requirements of closely associated "musts" in wire drawing practice.

New Formula No. 77 is made especially for high carbon wire drawn from patented stock.

Other "Seventy" numbers will appear in the series as further experiments are conducted and definite improvements secured.

No. 70—Stainless Steel and alloys.

No. 77—High carbon patented rod or ire.

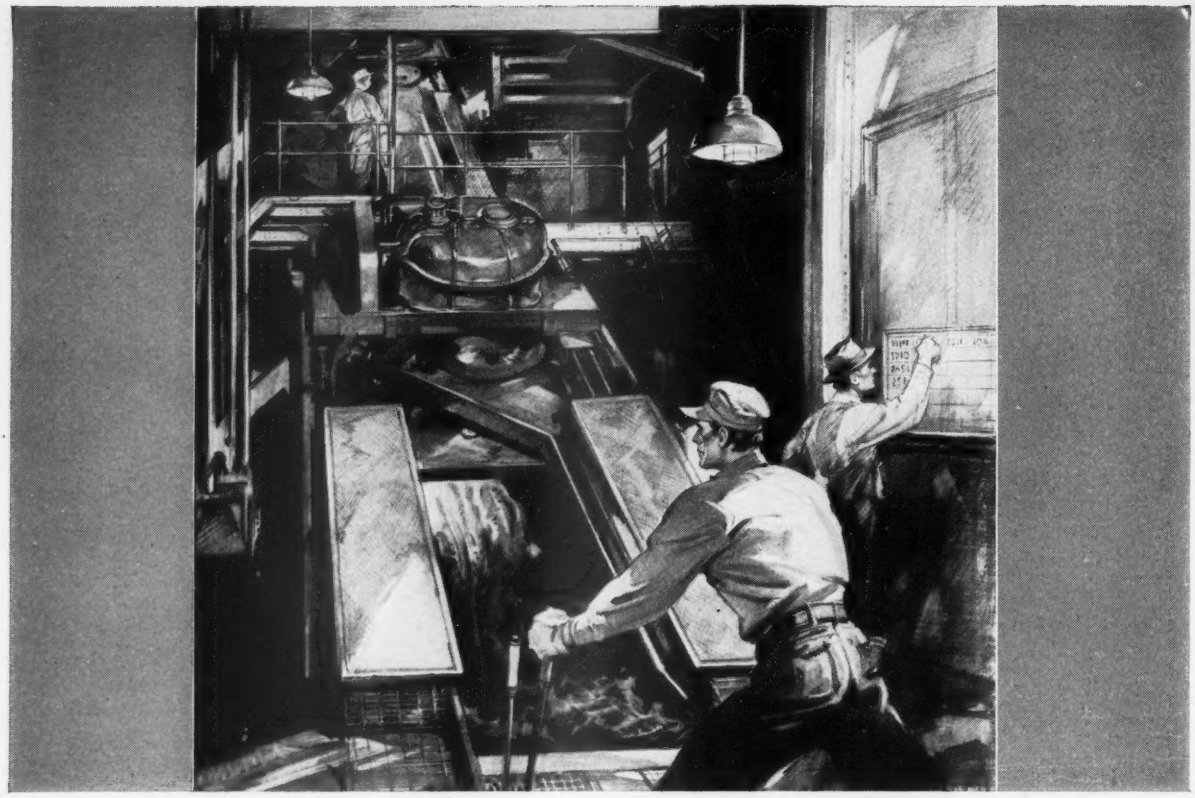
We will welcome inquiries bearing on your mill practice and possible improvements in it. If you are not getting the "lease of life" from your dies which you think you should, it may pay you to consult us on further developments of this "Seventy Series." Longer life of dies and specific improvements in the product are the twofold aim of this particular series of our formulas.

Standardize with Standard

STANDARD INDUSTRIAL COMPOUNDS CO.

4600 W. FERDINAND STREET, CHICAGO 44, ILLINOIS

Standardize with Standard



LAUNDERED COAL IMPROVES STEEL

At the steel plants, coal is laundered by washing and drying to rid it of impurities. This operation, as well as others born of coal research – the sampling, testing and blending of coal at the mines – contributes to production of stronger, cleaner-burning coke, the fuel for blast furnaces. With better coke, more and better iron is produced and the tonnage and quality of steel improved.

Research at the mines and limestone quarries and in the steel plants, improves and safeguards quality and advances production of new steels which are now helping to win the war. After the war is won, these new steels will continue to serve America by contributing to peace-time prosperity.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA

J&L STEEL

CONTROLLED QUALITY STEEL FOR WAR

J&L STEEL

IT'S CONTINENTAL WIRE *All the way*

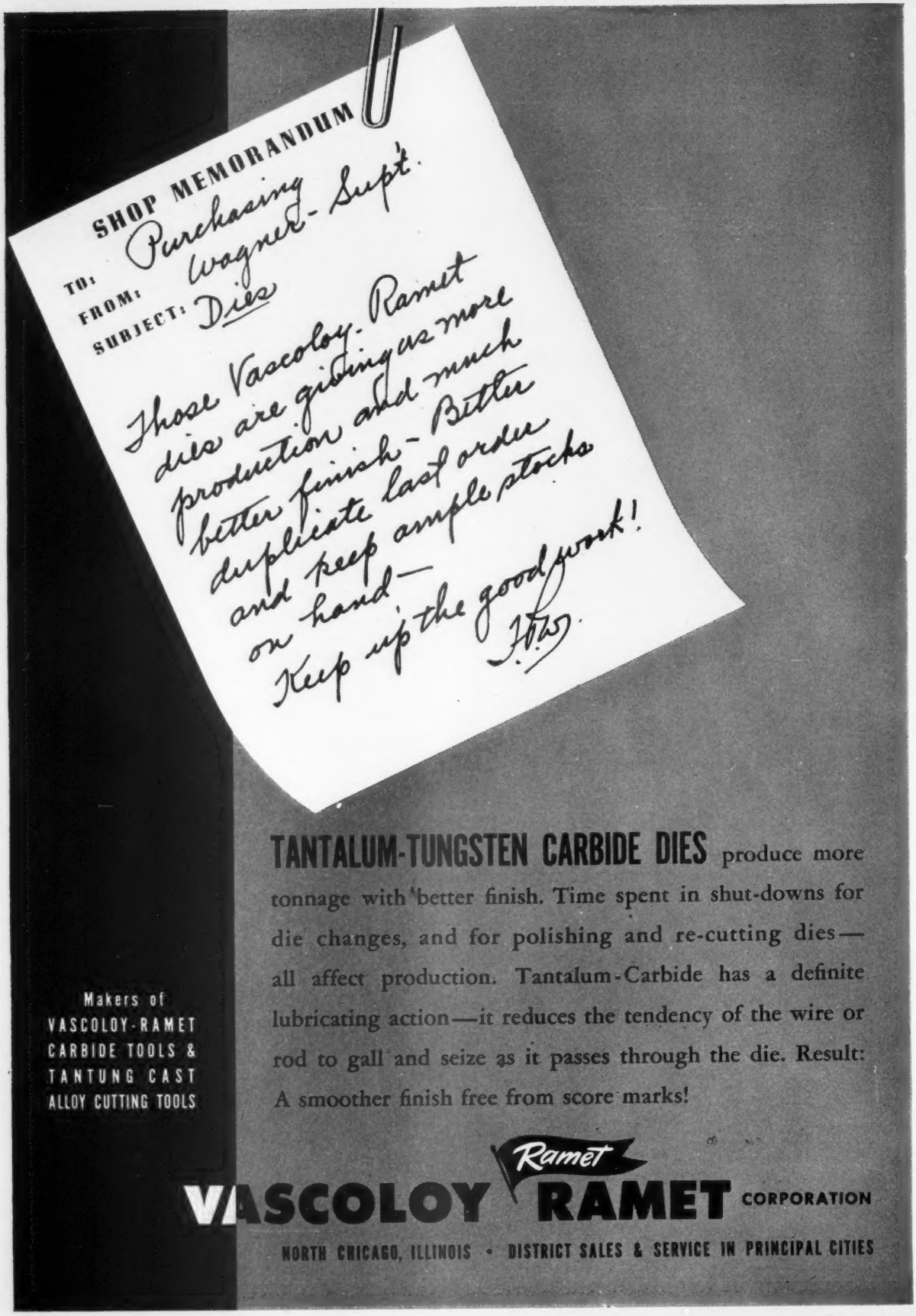
Quality control at Continental carries through all steps of wire fabrication. From furnace to finish, Continental wire is under the supervision of Continental's own workmen. Continental's integrated, modern facilities make it possible to produce wire with superior qualities for many uses and methods of fabrication . . . wire in a wide variety of specifications to meet the exacting requirements of manufacturers.

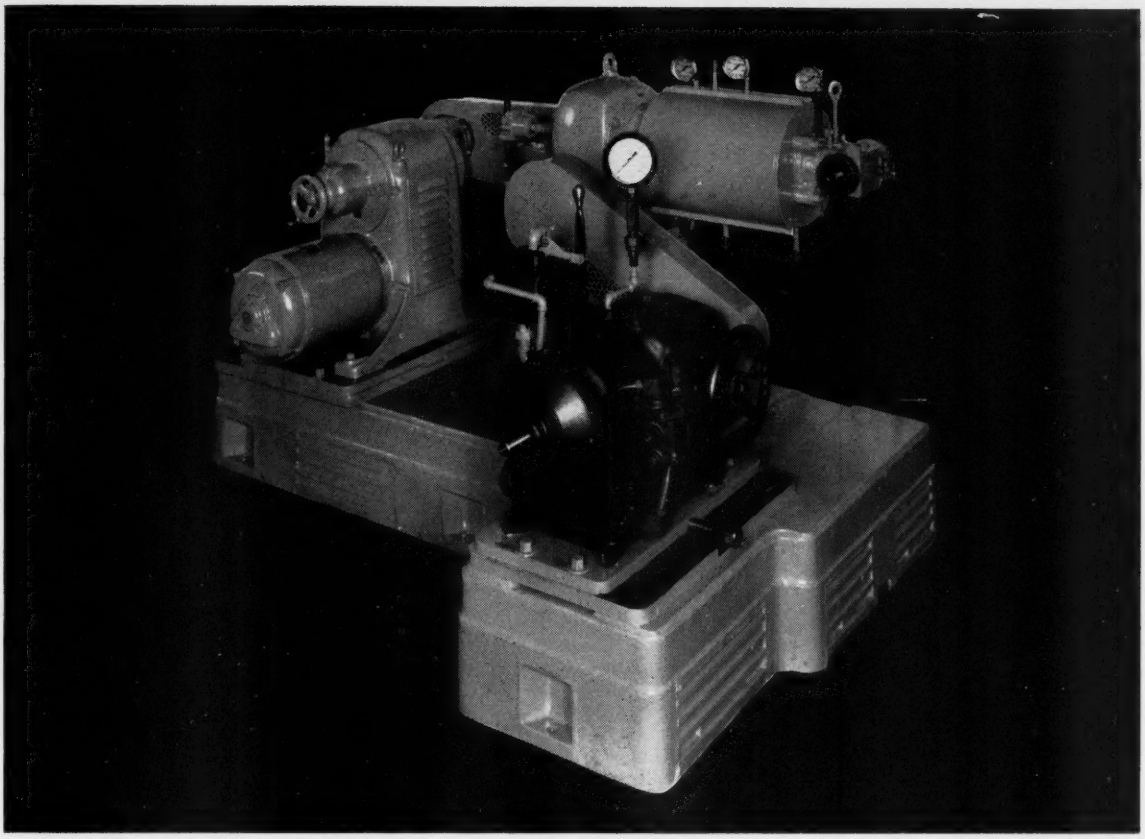
CONTINENTAL STEEL CORPORATION, KOKOMO, INDIANA

CONTINENTAL STEEL CORPORATION ★ SUPERIOR STEEL WIRE

CONTINENTAL
STEEL CORPORATION

PRODUCERS OF— **SHEETS:** Black, Galvanized, Copperier, Hot and Cold Rolled, Special Coated, Long Terne, etc.
WIRE: Bright Basic, Annealed, KONIK, Coppered, Tinned, Special Manufacturer's, etc.


SHOP MEMORANDUM
TO: Purchasing
FROM: Wagner - Supt.
SUBJECT: Dies
Those Vascoloy-Ramet dies are giving us more production and much better finish - Better duplicate last order and keep ample stocks on hand—
Keep up the good work!
J.W.
Makers of
VASCOLOY-RAMET
CARBIDE TOOLS &
TANTUNG CAST
ALLOY CUTTING TOOLS
TANTALUM-TUNGSTEN CARBIDE DIES produce more tonnage with better finish. Time spent in shut-downs for die changes, and for polishing and re-cutting dies—all affect production. Tantalum-Carbide has a definite lubricating action—it reduces the tendency of the wire or rod to gall and seize as it passes through the die. Result: A smoother finish free from score marks!
Ramet
VASCOLOY RAMET CORPORATION
NORTH CHICAGO, ILLINOIS • DISTRICT SALES & SERVICE IN PRINCIPAL CITIES



"ENOUGH AND ON TIME"

Thanks To American Industry . . .

When the history of this war is written it may well be that the most serious setback handed the Axis was dealt when American Industry spontaneously and wholeheartedly pooled its knowledge and resources. Superb teamwork developed synthetic materials to replace those seized by the enemy; new and quicker manufacturing processes were evolved.

Since the first "tubing" machine was produced 64 years ago John Royle & Sons, working in close cooperation with Industry, have kept pace with each phase of development in the extrusion field. Royle Extruders are built to meet the specific requirements of the application involved.

Naturally, there has been a wealth of knowledge and experience acquired. This "know how" is built into Royle Equipment — reflected in performance records.

JOHN ROYLE & SONS

ROYLE
PATERSON
N. J.

PIONEER BUILDERS OF EXTRUSION MACHINES SINCE 1880

PATERSON 3, NEW JERSEY

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JAMES DAY (MACHINERY) LTD.
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Sherwood 2-8262

AKRON, OHIO
J. C. CLINEFELTER
University 3726

One of a Series of Articles on the Preparation of Metal Surfaces for Protective Finishes

PRINCIPLES OF PICKLING

WHY INHIBITORS ARE ESSENTIAL

It is the purpose of this series of articles to sift among the unsystematized mass of facts and beliefs that have caused confusion in the pickling of steel, and disclose the facts that are essential to the efficient operation of the process and then present them in practical form to the pickling operator.

Pickling is defined as "the immersion of objects in dilute acid." Various kinds of acid, including sulphuric, hydrochloric, nitric, hydrofluoric, phosphoric and mixtures of these, may be employed according to the various requirements, but sulphuric is most suitable for most pickling.

How Scale Is Formed

The purpose of most pickling is to remove scale from steel. In working steel into required shapes, the preliminary operations are performed at high temperatures and in contact with air. Under these conditions the metal surface is oxidized into a layer of scale. The characteristics and composition of scale vary widely, depending on how hot and how long the metal was heated, and how the metal was processed while hot.

Pickling is also employed to remove from steel incrustations of rust, lime, or silica. Since pickling as a rule is carried out in exactly the same way no matter what type of coating or deposit is to be removed, the word "scale" will be used to include the above coatings also.

Why Scale Must Be Removed

Scale must be removed from steel in process of manufacture for, being hard and brittle, it causes excessive wear on the rolls and dies used in fabricating the metal. Also, unless the scale is removed from the metal prior to working it, fragments of scale become embedded in the metal, making it impossible to obtain a smooth metallic finish.

How Scale Is Removed

The most generally approved method for removing scale is pickling. Sulphuric acid, because of its low cost, is most widely used. Contrary to common belief, the sulphuric acid bath dissolves very little scale. Instead, the acid penetrates the minute fissures in the scale, and acts upon the intermediate bonding layers between the true metal and the true scale. These layers are dissolved rapidly, and the hydrogen evolved develops sufficient pressure to blast off large flakes of scale, exposing the true metal to the violent acid attack.

Hydrochloric (muriatic) acid, unlike sulphuric, actually dissolves large amounts of scale and, generally stated, produces a clean, bright finish free from "smut". Therefore, despite its higher cost, hydrochloric acid is coming into more general use where a clean, bright surface is desired. The selection of acid for any specific pickling operation depends largely on the determination of whether the advantages obtained from hydrochloric acid compensate for the higher cost.

Dangers of Pickling Without An Inhibitor

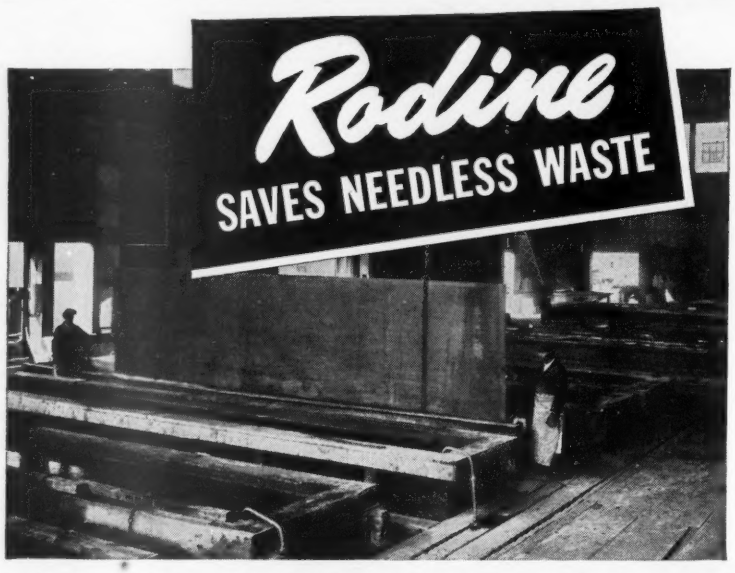
Steel has a composite crystalline structure and, since some of the crystals are more soluble than the others, when acid attacks the metal it does not do so uniformly but etches out the crystal pattern, thus causing roughening and pitting, sometimes so deep that the tensile strength of the steel is impaired.

Steel is an alloy of iron and carbon, but only the iron is dissolved by the pickling acid. The carbon remains on the surface as a black coating — "smut" — especially objectionable on wire where it may mask particles of hard scale and cause excessive wear on dies.

Rodine Solves Pickling Problems

For a long time the difficulties described were looked upon as necessary evils. The American Chemical Paint Company, however, refused to accept this philosophy and, as a result of scientific research, developed the selective control chemical, Rodine.

Rodine effectively retards the action of the acid on the steel without retarding the removal of the mill scale or incrustations of rust, lime, salts, etc.



Rodine is an inhibitor which effectively controls acid in the pickling bath, confining its action to the removal of scale and rust and preventing the acid attack on clean metal.

Rodine Saves

Acid ..... prevents acid waste in dissolving good metal
Metal ..... minimizes metal loss
Rejections .. minimizes embrittlement, blistering and marred surfaces
Time ..... makes speed possible without danger of overpickling

These are but a few of the many advantages of Rodine discussed in our Technical Service Data Sheets which we will be glad to send on request.

Manufacturers of Inhibitors & Metal Working Chemicals

AMERICAN CHEMICAL PAINT CO.
AMBLER ACP PENNA.

Note—West Coast Plants may address inquiries and orders for prompt delivery to Leon Finch, Ltd., 728 East 59th St., Los Angeles, California

AMERICAN CHEMICAL PAINT COMPANY, AMBLER, PA.
Please send me general Technical Service Data Sheets on
Name_____ Title_____
Company_____ ☐ *Rodine*
Address_____ 12-3

A CRANE PER BLOCK . . .

SPEEDS ROD PRODUCTION AT ATLAS STEELS LIMITED

No time is lost in the stripping of rod from the drawing blocks at the Atlas Steels Limited, Welland, Ontario. Each block is provided with its individual crane so that the operator can strip the block immediately at the end of the run without delay.

Having ample crane service is especially important because much of the rod is run through in small lots and requires handling every few minutes. Since the rod is of high grade alloy steel that is vitally needed for the war effort, it is essential that the blocks be in operation every possible moment.

The cranes not only speed production but bring about sizeable savings that pay for the cranes in a short time. Hernia injuries from heavy liftings are eliminated.

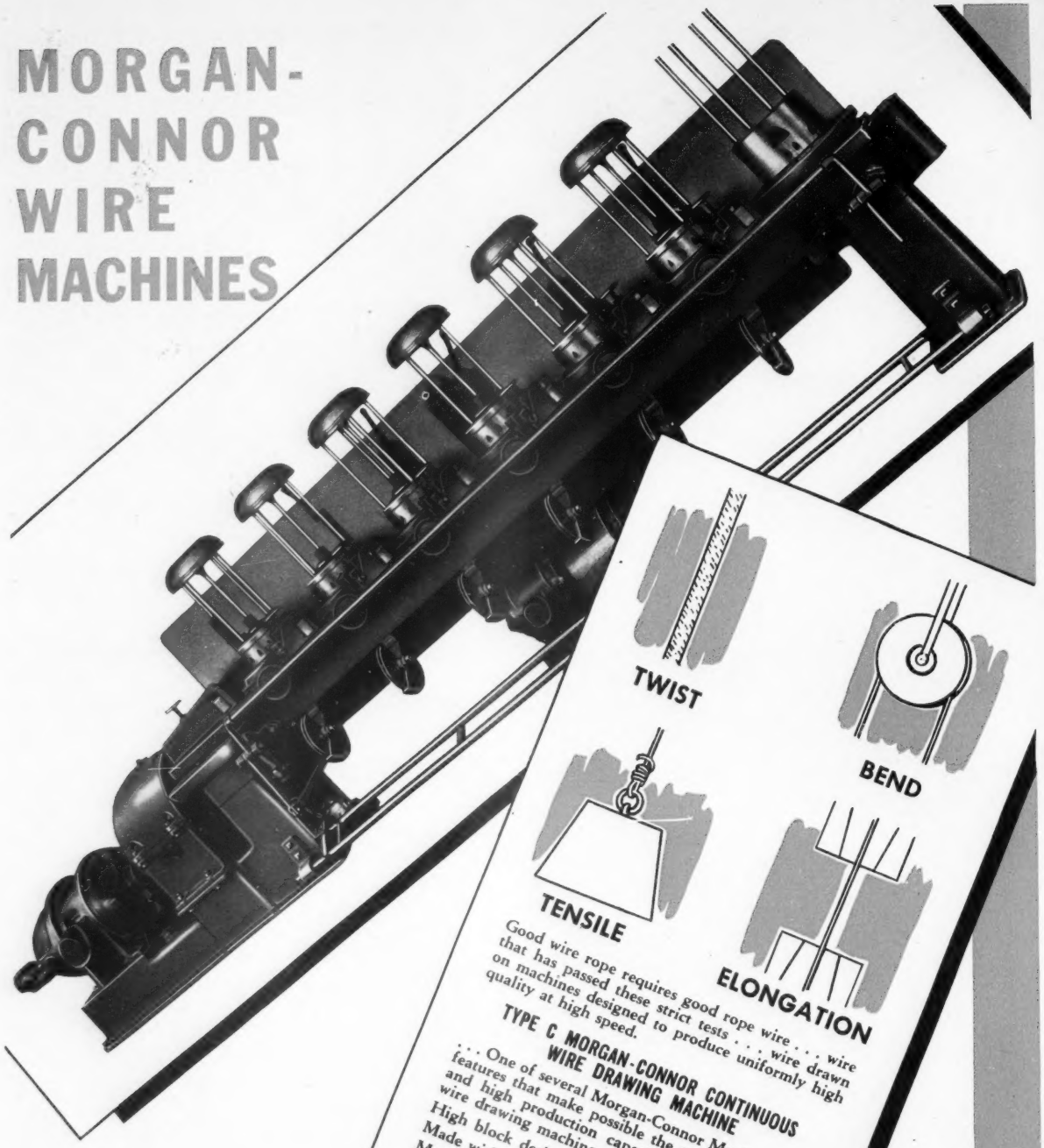
Cleveland Tramrail block-stripping cranes and carriers are serving many rod and wire-drawing plants with both internally and externally-stripped blocks.

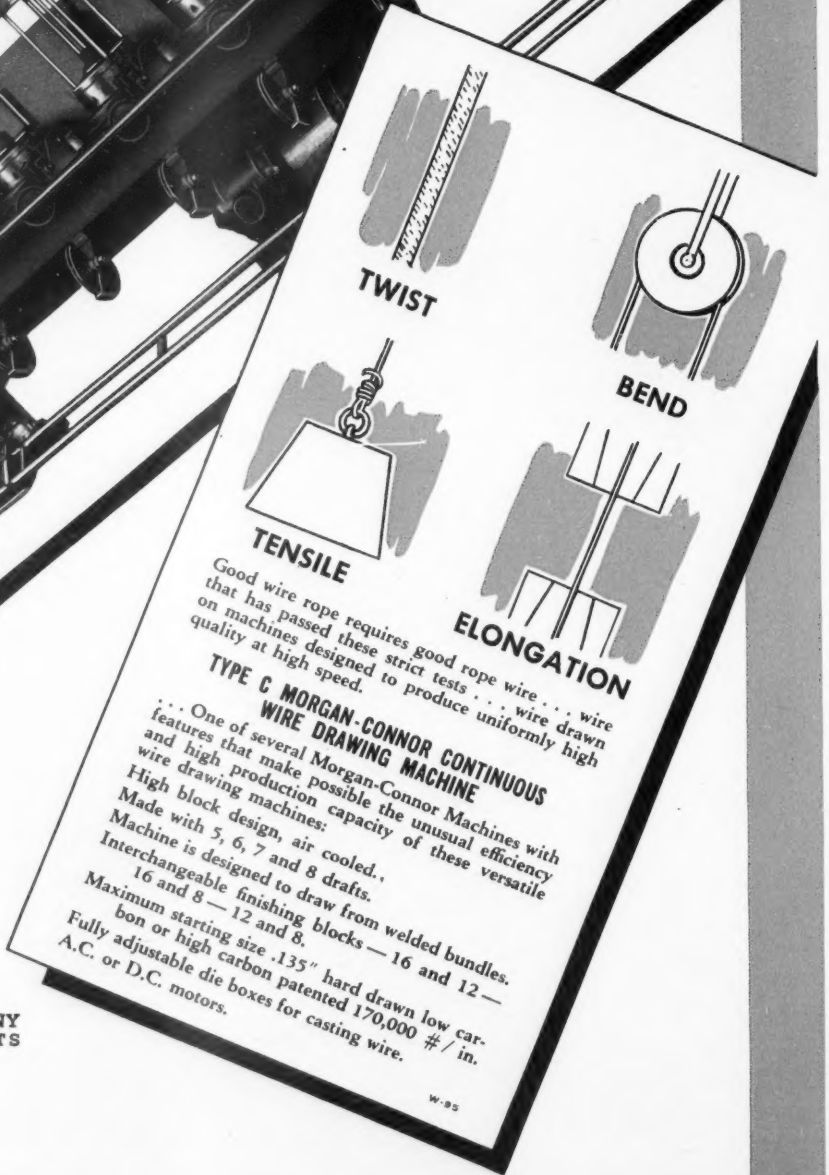
GET THIS BOOK!
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1141 EAST 283RD ST. WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

MORGAN-CONNOR WIRE MACHINES





Good wire rope requires good rope wire . . . wire that has passed these strict tests . . . wire drawn on machines designed to produce uniformly high quality at high speed.

TYPE C MORGAN-CONNOR CONTINUOUS WIRE DRAWING MACHINE

. . . One of several Morgan-Connor Machines with features that make possible the unusual efficiency and high production capacity of these versatile wire drawing machines:

High block design, air cooled.,
Made with 5, 6, 7 and 8 drafts.
Machine is designed to draw from welded bundles.
Interchangeable finishing blocks — 16 and 12 — 16 and 8 — 12 and 8.
Maximum starting size .135" hard drawn low carbon or high carbon patented 170,000 #/in.
Fully adjustable die boxes for casting wire.
A.C. or D.C. motors.

W-95

MORGAN
WORCESTER
ENGINEERS AND
MANUFACTURERS.

MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS

WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 19 MARCH, 1944 No. 3

Designated as

Official Publication By The Wire Association

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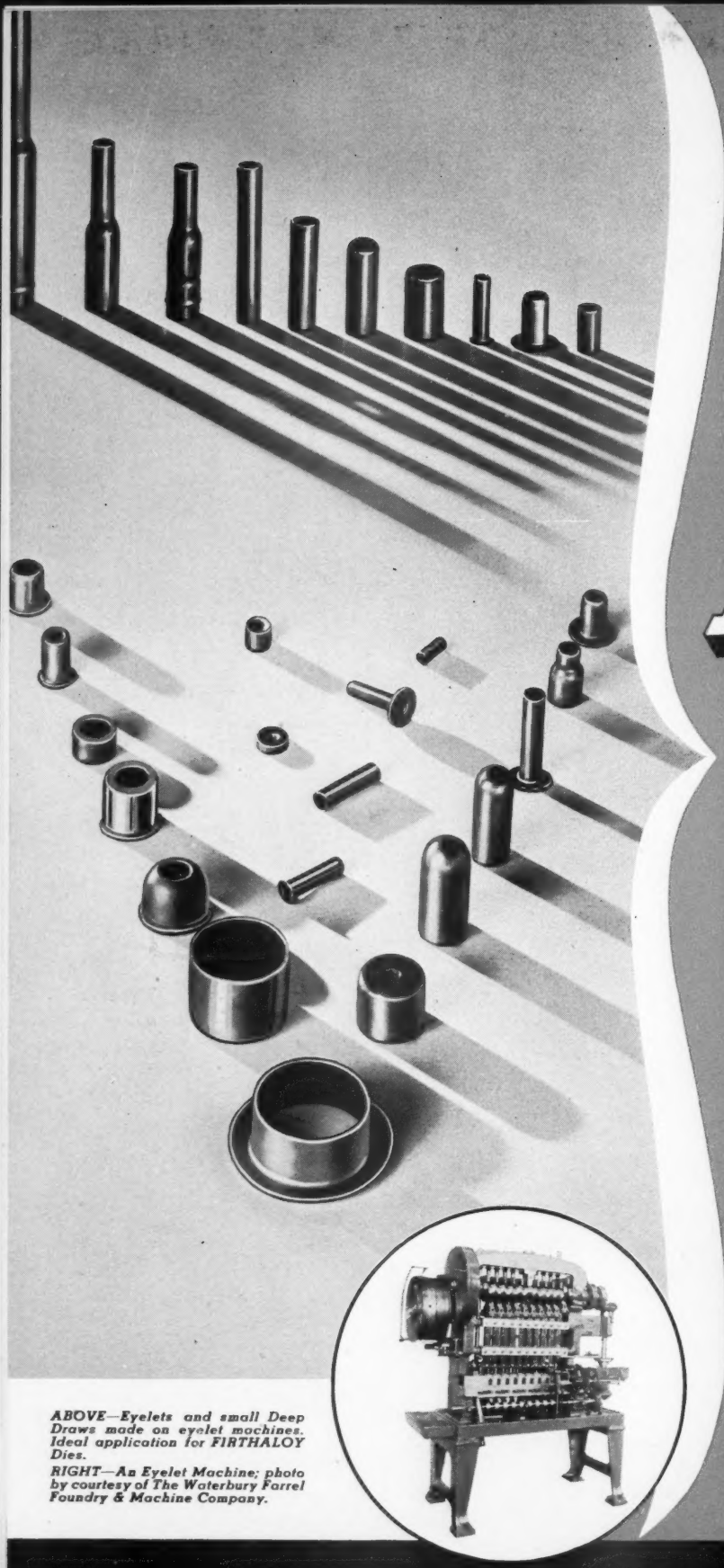
NEW

STEVENS LIGHT WEIGHT FLANGED STEEL TRAVERSE FOR REELS . . . .

FOR years the Stevens Steel Traverse for reels has served the Wire and Cable Industry admirably. Now, the new improved type "S" goes a step farther. . . Lighter in weight, it lowers shipping costs. Being of stronger construction, it further reduces the potential hazard of damage to wire and cable in transit as well as in the field. Write today for data, descriptive matter, and specifications on this Stevens development.

Manufactured under license arrangements with Western Electric Company, Incorporated.

THE STEVENS METAL PRODUCTS CO., NILES, OHIO



When the Eyelets go on again . . . all over, the word will be

Firthaloy

(the Standard Carbide)

Eyelet manufacture has, to a great extent, been suspended during the war—except for the making of eyelets that go into war parts.

Now, however, many of the former manufacturers of eyelets are thinking in terms of peace-time products. This trend is indicated by the repeated requests from our customers for information on FIRTHALOY Eyelet Dies.

Our engineers are ready and willing to co-operate with present or prospective makers of eyelets in solving any problems that may be encountered in the current planning for post-war production.

After the war, as before it, FIRTHALOY will be among the leaders in eyelet work. Users of FIRTHALOY Eyelet Dies will benefit from FIRTHALOY'S knowledge, experience, and demonstrated success in this field.

ABOVE—Eyelets and small Deep Draws made on eyelet machines. Ideal application for FIRTHALOY Dies.

RIGHT—An Eyelet Machine; photo by courtesy of The Waterbury Farrel Foundry & Machine Company.

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING --- EXTRUDING --- FORMING --- FABRICATING

Vol. 19 MARCH, 1944 No. 3

Making "Spring Grade" Beryllium Copper Wire

By F. S. Stickney,

Vice President, Little Falls Alloys, Inc.,
Paterson, New Jersey.

AS a commercial wire product beryllium copper has been available only a few years. Yet because of its unusual properties, it has found an increasingly important place as a spring material. As with all new materials, however, it has taken experience and a considerable amount of development in processing method to find out just how it should be handled.

✦ ✦ ✦

BERYLLIUM copper is a heat-treatable alloy combining exceptional strength with corrosion resistance, high endurance strength, and heat hardening after forming. For these reasons it most nearly approaches the ideal material for springs. In its heat-treated form it also has high proportional limit, extreme stability or freedom from drift, and the highest electrical conductivity of any spring material. These unusual properties early led to the use of beryllium copper wire as a spring material. But early attempts to draw beryllium copper wire in the smaller sizes ranging from around .050 down to .005 brought a good many headaches.

F. S. STICKNEY

A native of Maine, was graduated from University of Maine in 1923 as B.S. in Mechanical Engineering. After a year of study in Westinghouse Electrical Engineering and Mechanical Design Schools, was assigned to design work on electrical instruments at the East Pittsburgh plant of Westinghouse Electric & Manufacturing Co. Transferred to the Newark, N. J., Meter Works in 1927 as Design Engineer. In 1941 became Vice President and Chief Engineer of Instrument Specialties Company, Inc., at Little Falls, N. J., and later Vice President of Little Falls Alloys, Inc. Member of Montclair Society of Engineers, a licensed Professional Engineer in N. J., and a member of the Wire Association.

One of the major problems was excessive die wear caused by the abrasive character of the oxide film which formed on the wire. Another problem was lack of uniformity in rod stock, but the most serious problem was the lack of uniformity in the hardening response and temper of finished wire.

✦ ✦ ✦

IN attempting to arrive at a practical solution to the problem of drawing "spring grade" beryllium copper wire, the first move was to start with an entirely clean slate. These individual problems of variation in rod quality, material cleaning at all stages, and proper annealing were tackled one at a time until step by step the procedure described here was developed. Then a plant was equipped to handle the process. The result is "Silvercote" spring grade beryllium copper wire, uniformly heat-treating to higher physical properties with uniform temper and spring-back, and a distinctive

Designated as Official Publication by the Wire Association

silver coating which not only reduces wear on coiling tools but also improves the electrical characteristics of the heat-treated surface.

✦ ✦ ✦

BEFORE describing the "Silvercote" process and the control method used, it would be well to outline the present supply situation of beryllium copper since there have been many conflicting statements regarding its availability. During 1941 the demand increased beyond the available supply and additional facilities for producing beryllium were started. Before the new plants came into operation the latter part of 1942, the shortage became troublesome—but not because of a shortage of ore. In fact, for a while the real shortage was in copper. Early in 1943, however, production was at a rate sufficient to make 6,000,000 pounds of 2% beryllium copper per year and further expansion recently completed has increased this capacity to 20,000,000 pounds per year—which will make a lot of wire.

✦ ✦ ✦

Raw Material Inspection

ONE of the first problems faced in developing the "Silvercote" process was that ASTM specifications for beryllium copper rod stock were inadequate. ASTM-B120 calls for the following:

	Tensile Strength	Hardness, Rockwell
Annealed Rod	**80,000 max.**	**30T68 max.**
Heat-treated	**150,000 min.**	**30N53 min.**

✦ ✦ ✦

TO obtain the higher physical qualities needed for "spring grade" wire, it is necessary to set higher specifications for the incoming material.

✦ ✦ ✦

GOOD bar stock annealed will have a maximum tensile strength of 60,000 or a hardness of Rockwell 30T60; after hardening it should reach 165,000 psi minimum tensile strength or Rockwell 30N59. However, these properties alone do not guarantee satisfactory final results since wire may have these initial properties and still fail to harden properly because of lack of available beryllium.

✦ ✦ ✦

INCOMING material inspection must, therefore, be made on the rod in the heat-treated condition to insure final performance as spring wire. When annealed rod stock as received from the mill fails to respond sufficiently to the hardening test it may not necessarily be due to lack of beryllium content, but rather to incomplete solution heat-treatment at the mill. If so, a properly controlled solution treatment must be given the rod before it will make satisfactory "spring grade" wire. There are other conditions not so readily revealed which may result in low quality wire. Some types of faulty structure can not be remedied by a prolonged solution heat-treatment and must be weeded out of the process. These faults are best detected by examination of the microstructure. The fundamental problem is to produce this "spring grade" wire from available "ASTM grade" raw material.

✦ ✦ ✦

THIS end is accomplished by the following procedure. Samples are taken from each end of each coil of incoming bar stock and heat-treated to peak hardness. Coils reaching Rockwell 30N59 or better on both ends are released for a predetermined normal processing. Samples failing to reach this hardness value are solution heat-treated at 1475°F for 15 minutes, followed by rapid quench in water. These repeat samples are rehardened to peak hardness and those now testing Rockwell 30N59 or better are sent through the wire mill with special processing which involves a longer solution heat-treatment in the strand furnace. Since the first group passed has had an adequate solution heat-treatment the strand annealing must be properly controlled to remove the drawing stresses without affecting the "available" beryllium; annealing of

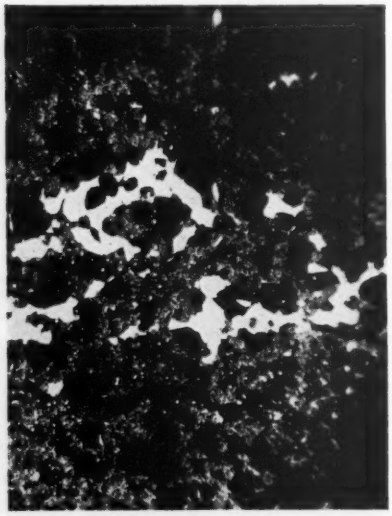

Fig. 1. Photomicrograph at 250 diameters showing excessive beta segregation in the center of rod stock. This condition cannot be corrected by annealing and the material will not make "spring grade" wire. ✦ ✦ ✦

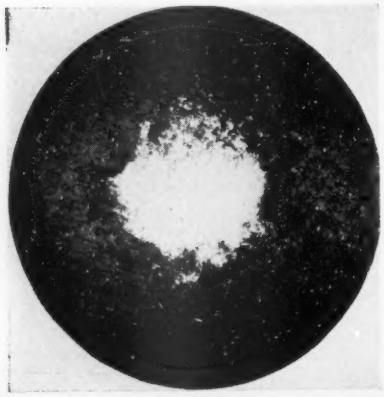

Fig. 2. Light area shows portion of the material which does not respond to hardening and no reclaiming process is effective. (250 diameters)

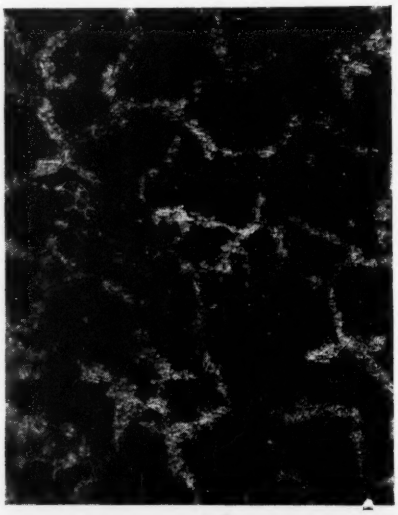

Fig. 3. Rod stock showing this amount of grain boundary precipitate may usually be corrected by solution heat-treatment before processing. (250 diameters) ✦ ✦ ✦ ✦

the second group must not only remove the drawing stresses but increase the "available" beryllium to the point where the wire will be "spring grade."

✦ ✦ ✦

SPECIMENS from all lots, including those which fail to pass the second test are examined for microstructure, since it is always possible that wire meeting the hardening test will contain other faults rendering it unusuable. Cross section specimens are taken from each end of each coil, hardened and mounted ten at a time in a bakelite mount. The mold is polished by usual methods and etched with ammonium persulphate to bring out the grain structure. For acceptable material the microstructure should show a grain size of .030 to .090 mm. diameter. Beta particles, if present, should be uniformly distributed and the grain boundaries free of excessive "boundary precipitate." Hardening should be uniform across the section as shown by uniform darkening due to the etch. The cross section should also be free of mechanical defects as splits, voids, seams, and coring. Excessive beta segregation in the center as shown in Fig. 1 is a casting fault which can not be corrected at the wire mill stage and must be rejected. If the structure shows an area with no evidence of hardening as in Fig. 2, the material must be rejected as no reclaiming process is effective. Material with excess grain boundary precipitate as illustrated in Fig. 3 may often be corrected by a prolonged solution heat-treatment at 1450-1500°F for several hours. Such prolonged heat-treatment necessarily produces excessive grain size and it may be necessary to give this solution treatment in several stages with moderate cold work between anneals. The grain boundary precipitate must be substantially reduced before the final anneal to obtain uniform "spring grade" wire.

✦ ✦ ✦

The "Silvercote" Process

WIRE rod which has been approved by the laboratory is placed in separate storage, ready for drawing as shown in line 2 of Fig. 4. Rod from several sources is being used, and there is a wide variation in the surface condition. much of the material has been overpickled in an effort to remove the tight scale from batch annealing. Some rods are chocolate colored as a result of inadequate cleaning or incomplete washing. All rods are slightly oxidized from exposure to the air. Beryllium is very active chemically, and the beryllium copper alloy will discolor noticeably in a few seconds exposure to air if wet with rinse water containing a small trace of certain cleaning solutions. Even perfectly clean beryllium copper, protected by wire-drawing lubricant of neutral character, will discolor perceptibly in less than an hour.

✦ ✦ ✦

IN line 3 of the process layout, the rod enters a strand cleaning unit, which removes dirt and oxide. Cleaning solutions are washed off, and the rod is coated immediately before additional oxides can form. The rod is drawn through the first die, and from this point on it is kept covered with a protective coating at all times, except for short periods of a few seconds during anneals, as will be explained later. Line 4 represents drafting of the coated wire by conventional methods. Beryllium copper must, of course, be kept cool during drawing operations to prevent age hardening. There is no difficulty in using carbide dies down to .032 diameter with properly annealed and coated wire. Lubricants are chosen for ease of removal.

✦ ✦ ✦

AFTER a reduction of 75% to 85% the coils of wire are transferred to the strand annealing process, line 5. The annealing speed for each size and analysis of wire is set up by the laboratory tests outlined previously and is carefully followed. Since smaller wires can be annealed at higher speeds, all take-up blocks are equipped with individual variable

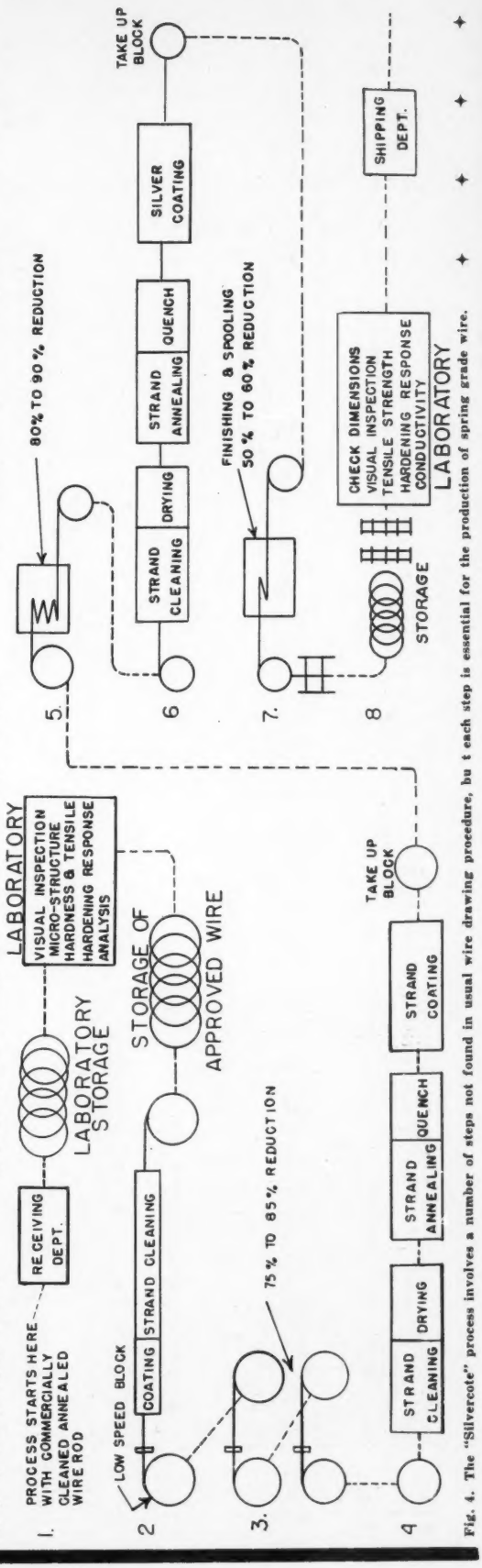

Fig. 4. The "Silvercote" process involves a number of steps not found in usual wire drawing procedure, bu t each step is essential for the production of spring grade wire.

speed drives, so best annealing speed for each wire is readily obtainable. The hard-drawn coated wire is first passed through a cleaning unit which removes dirt, lubricant, and coating. Cleaning solutions are rinsed off, and the wire is thoroughly dried before it enters the furnace. Great care must be exercised in these operations, since a slight trace of water, air, or other source of oxygen in the furnace will cause formation of a highly abrasive beryllium compound on the surface of the wire.

Fig. 5. Each coil and spool of "Silvercote" spring grade beryllium copper wire is tested for tensile strength, conductivity, and hardening response to standards calling for higher properties than ASTM specifications. ✦

✦ ✦ ✦

THE annealing temperature for beryllium copper is very critical. Too low a temperature results in under annealing, which can be detected by physical tests and measurements of grain size. The incipient fusion point of the alloy is only a few degrees above the best operating temperature, hence excessive temperature causes the wire to break in the furnace. As a result of these limitations, furnace temperature must be carefully held within a few degrees throughout its entire length. Thermocouples, temperature controller, and combustion equipment must be of first quality, properly designed for the purpose, carefully adjusted, and carefully maintained.

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BERYLLIUM copper must be quenched rapidly from the annealing temperature to secure the desired supersaturated alpha solution. One serious difficulty with batch annealing has been variable hardness due to variations in the quenching rate between the outer and inner turns of the bundle. With strand annealing, the entire length of the wire is annealed and quenched at a uniform rate which greatly improves the quality and uniformity of wire. This annealing process produces a perfectly clean, bright, golden-yellow wire. To prevent oxidation of the annealed wire, it is coated for drawing as soon as it leaves the quench, and coiled on the take-up block.

✦ ✦ ✦

FURTHER drawing operations (line 6) are performed in the usual manner. Reductions of 80% to 90% are now possible due to the improved and uniform ductility resulting from strand annealing. Coatings are satisfactorily retained during this reduction. Successive anneals and reductions are performed to bring the wire to the "get-ready" gauge which for beryllium copper is usually 3 to 4 B.&S. numbers larger than the finished diameter. The wire is then given the final solution anneal (line 7). This anneal is similar to the process anneals except for the linear speed. Upon emerging from the quench, the wire is passed immediately through a silver coating unit, is washed, dried, and collected on block or spool, depending upon size. Final drafting and spooling (line 8) is accomplished in the usual wet type of machine. Each spool or bundle of finished wire is checked for diameter and finish, and then turned over to the laboratory for final test.

✦ ✦ ✦

Final Inspection

INSPECTION of the finished wire is unusually complete. Each spool is checked for conductivity and initial tensile strength, and hardening response is checked by heat-treating samples from representative spools at varying times at 700°F. Tensile strength and electrical conductivity are measured on each sample and plotted against heat-treating time. Then, heat-treating time for peak response for the lot is selected and samples from each individual spool or coil are hardened for that time. The tensile strength of individual samples must not vary more than 5 percent from the average. To be acceptable the tensile strength must be 190,000 lbs. per square inch or higher (ASTM specifications are 180,000 lbs. per square inch). In practice, the tensile strength is usually over 200,000 lbs. per square inch. More important even to the spring user is the uniformity of response to a given heat-treatment. Heat-treating response is largely determined by the accuracy of control over the last solution heat-treatment and is possible only with predetermined control of temperature, speed through the furnace, and the rate of quenching.

✦ ✦ ✦

RIGID inspection of rod stock, careful and accurate control of processing, and 100 percent checking of finished wire is what gives "Silvercote" beryllium copper wire its "spring grade" properties. With this degree of control, beryllium copper wire can be made to deliver the full inherent and expected properties of the alloy.

"THE MACHINES THAT PUT THE 'RINGS' IN SPRINGS"

No. 3 Universal Spring Coiler

640" Model—Series 677

CAPACITY .092" to .283"

Improved Clutch Type

PATENT NO. 2,175,426

SLEEPER & HARTLEY, Incorporated

Worcester, Massachusetts, U. S. A.

Development of Electric Heating for the Wire Industry

By A. E. Bellis,
President, Bellis Heat Treating Company, Branford, Conn.

Relatively new to industry, the salt-bath furnace has undergone many refinements that have brought it to a high operating efficiency. Major Bellis outlines some of these developments. ✦ ✦ ✦ ✦

AT a convocation on industrial electric heating in 1928*, it was recognized that electric heat had already proved most valuable as an aid in research and the electric furnace had been fruitful as a means of obtaining the scientific knowledge on the heat treatment of metals. The opening remarks stated:

✦ ✦ ✦

"ANYONE who studies even casually the conditions of modern life cannot fail to sense the tremendous importance of electricity as a source of power and heat, nor to realize that it must, so far as we can see at present, become a vastly more important factor in the economic situation of the future. Our coal and petroleum are natural products, which in their very nature will some day be exhausted, and we are even now witnessing their rapid and almost uncontrolled depletion.

✦ ✦ ✦

"WHATEVER may be the commercial use of electric heat it is certain that it has proved most valuable as an aid in research. The definite temperature control and the facility for heating metals in a vacuum or in the presence of gases as may be desired has been a very great aid in the scientific and research investigations into the action of metals at different temperatures. The electric furnace has therefore been a most fruitful means of obtaining the present scientific knowledge on which the heat treatment of metals is based."

*Manufacturers Association of Conn.

IT is appropriate after fifteen years to consider one of the important industrial electric furnace developments (the electric salt bath) which was not mentioned at that time but of which hundreds of installations are now in operation.

✦ ✦ ✦

IT is surprising how far beyond the hopes and predictions of that 1928 conference the performance of some industrial installations have gone as indicated by the following list of initial installations of electrode salt baths and statements regarding them:

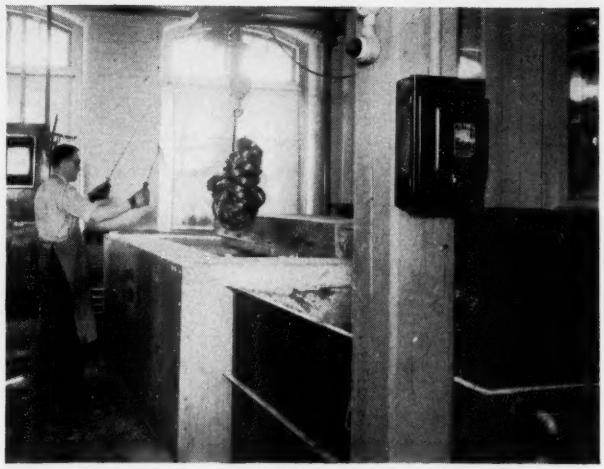
A. The work is back to the draw bench before they are set for the next hole.
B. The only means we have found for proper structures in narrow temperature ranges required.
C. No more trouble or headaches.
D. Absolutely no scaling, a better surface for redrawing.
E. It solves the atmosphere problem completely.
F. Now we hit the hardness specification "right on the button."

Gauge	Quality	Weight	Temp. In	Temp. Out	Time In	Time Out	Immersion Time	Recovery Time	Cooling Time
370 Square	Free Cutting	11-08	730	700	2-15	2-25	10	20	15
312	J.R.S.	11-0-26	720	690	2-45	2-55	10	20	15
166	J.R.S.	11-2-2	710	685	3-15	3-25	10		15
495	J.R.S.	11-0-0	700	685	3-55	4-15	15		Cooled before quenching

Gauge	Before Tensile	After Tensile
370 sq.		25.2
312	34.6	20.1
166	38.1	23.6
495	37.7	28.3

Gauge	Elongation	Elongation
370		33% in 2"
312	12% in 2"	40% in 2"
166	6% in 2"	42% in 2"
495		39% in 2"

Total of Wire: 45-2-8 SWT = 4528#
Electricity Consumed: 450 x .357 = 13.6 per 45-2-8
Unit per ton: 200 units
Out per ton: 22 cwts. = 2200#
Cost per ton of electricity $1.20
Lavite .20
Labor .36
1.76
Acid .20
$1.96



Heat Treating Eyeglass Temple Wire.

Gas Fired Salt Bath Furnace.

G. We do in minutes what took hours and do a better job.
H. The higher the heat, the greater the benefit.
I. It obviously takes less heat for the same work than other furnaces.
J. It is the only way we can get the uniformity we have to have.
K. We undertake all kinds of jobs to closer specifications than we could before.
L. Annealing is a few seconds operation now, it has streamlined our production.

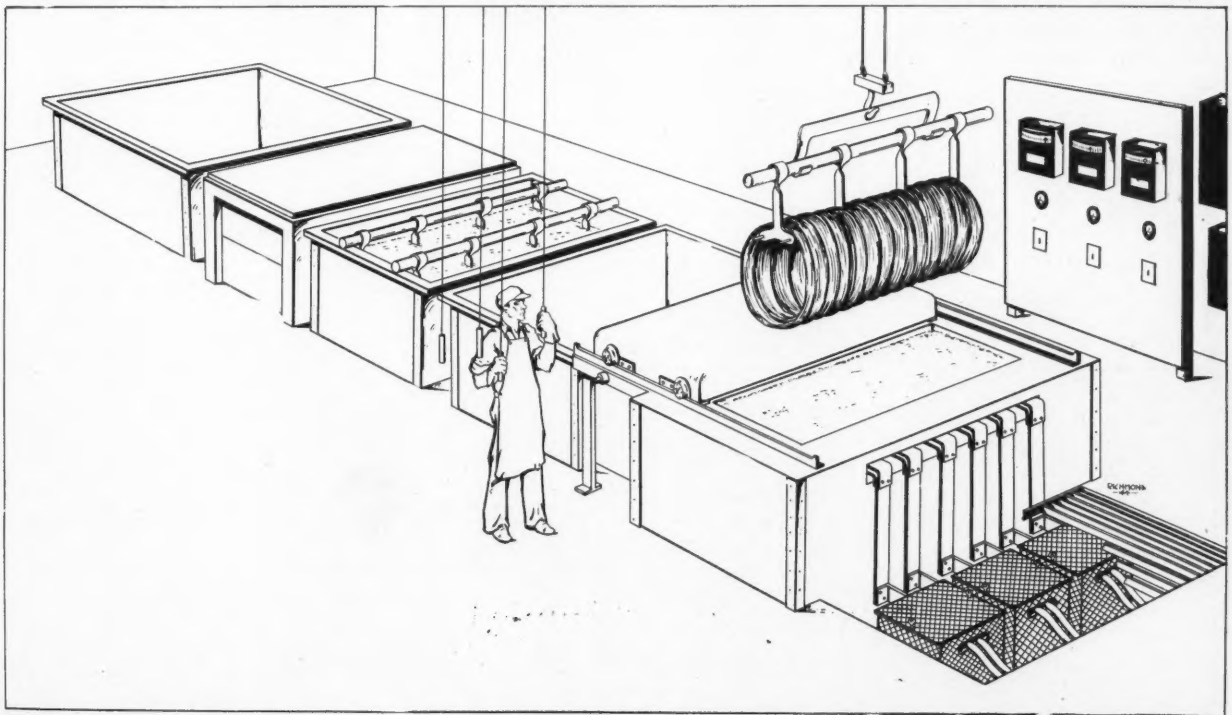
✦ ✦ ✦

THIS modern method for heating salt baths consists of passing electric current directly through the bath between electrodes immersed in the bath and the pot wall. Instead of putting the pot in a fuel-fired setting and transmitting heat through the pot wall, the pot is supported all around by insulating brick.

✦ ✦ ✦

SINCE the pot itself is of metal and, therefore, a conductor of electricity, it might be assumed that it would short circuit the current—in fact, neither the metal pot nor pieces of the work heat treated coming in contact with the electrodes does so. The highest resistance is near the electrodes, and circulation of the bath prevents local overheating. A metal pot is necessary as a container of the bath material to prevent contamination of the bath from any refractory materials which are oxides and, therefore, incompatible with metal. The metal pot is also an important factor in the storage and equalizing of heat in the furnace. When cold work is immersed in the bath a non-conducting film freezes around it, so if cold work accidentally touches two electrodes this solid insulating

(Please turn to Page 192)



Complete Annealing Installation.

Stretching the Life of a Nail Machine Crankshaft -- Through Metal Spraying

By Jess Copp,
Superintendent of Shops, Continental Steel Corporation,
Kokomo, Ind.

Maintenance has played an important role in keeping our war machines in operation. How Metallizing is keeping nail mills going is here described. ✦ ✦ ✦ ✦ ✦

FOUR years of constant service, hammering out nails and brads for vital construction purposes, formerly sufficed to make nail machine crankshafts good for nothing but the scrap pile. With replacements slow and uncertain, it became imperative to conserve these machine parts to overcome this production bottleneck. Metallizing was tried and found to be a satisfactory solution to our problem of maintenance.

✦ ✦ ✦

Wire Used to Make Wire Products

FOR producers of wire and wire products this should be an especially interesting conservation story because at Continental Steel we are using wire to maintain a machine that makes wire products. For in the metallizing process, the metal spray originates as wire driven (by an air turbine) through a metallizing gun into melting flame.

✦ ✦ ✦

Saving a Six Penny Nail Machine Crankshaft

OUR first experiment was with a six penny nail machine crankshaft, which we had built in our own plant. The crankshaft on this machine is continuously in operation — raising and lowering the upper half of the fabricating die. The crankshaft, a steel forging which we buy in the rough, weighs approximately 75 pounds, and its rough dimensions are 3 inches long by 2½ inches in diameter.

✦ ✦ ✦

SUBJECTED to severe shock, wear occurs on bearing surfaces and fits, and until we started using metallizing no repair was possible at all since bearing and fits must be standard. So that when wear occurred, these crankshafts had to be replaced for what was, after all, a superficial defect.

✦ ✦ ✦

Advantages Seen in Metallizing

WHILE replacements are possible today, they are slow and uncertain. If we had an unexpected breakdown we would lose many productive days waiting for replacements. The cost of a replacement was $85. With thirty-eight machines of this type we decided it might be worthwhile economically to investigate metallizing as a means of maintenance. This process of repairing crankshafts cost us only $15.10 annually per machine. Metallizing our 128 other nail and brad machines of various sizes will also result in cost savings, amounting to approximately $2460 annually.

✦ ✦ ✦

HOWEVER, more important at the present time is the saving of approximately 22,000 pounds of steel annually. Also, in rebuilding these parts we are relieving pressure on the forge companies who are turning out forgings for other essential war products.

✦ ✦ ✦

ALTHOUGH we have not had any of these metallized crankshafts in service long enough to wear out, our experience on other metallized parts in the past, leads us to believe that service from

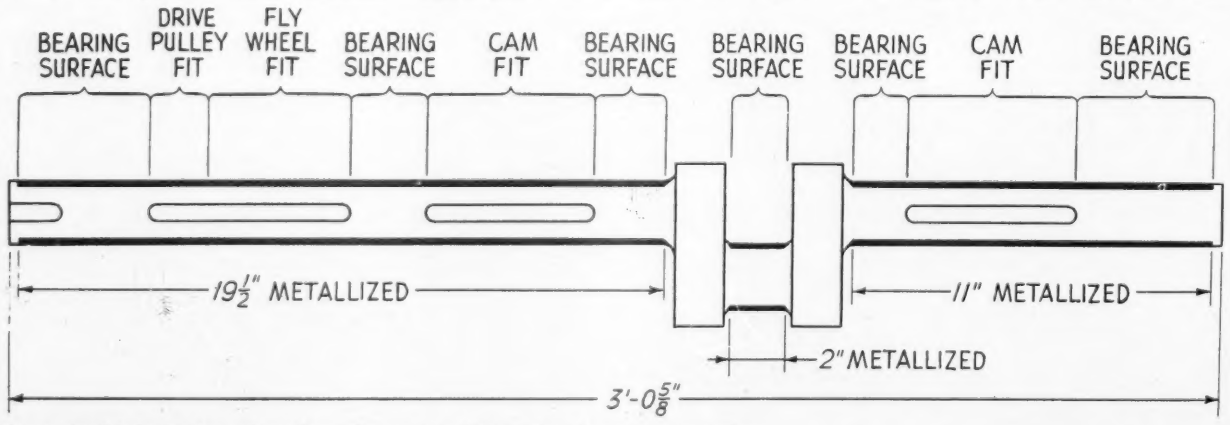


Fig. 1. Crankshafts for 128 nail machines—this one is typical—are kept in o rder by metallizing. ✦ ✦ ✦ ✦ ✦

them will compare favorably with new cranks.

✦ ✦ ✦

The Metallizing Process—Surface Preparation

IN metallizing the crankshaft we find that careful preparation of the surface is important. The shaft is undercut .030 on a side, below the finish size. It is then prepared by the METCO method — i.e., we cut a 16 thread with a round nose tool .045″ wide. This operation results in flat lands, .015 in. between the threads. These lands are upset and roughened until they are approximately .030 wide by the use of a rotary shaft preparation tool. This procedure is followed on all surfaces except the pin bearing, which is rough threaded. Approximately 2½ hours are needed for this operation and the cost is $5.00.

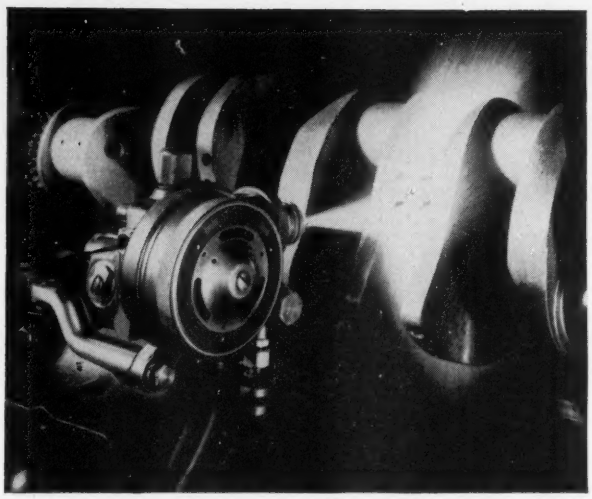


Fig. 2. METCO Metallizing Gun in operation.

✦ ✦

Spraying and Finishing

METALLIZING wires, to do the best job, should be selected for controlled and predictable properties after they are sprayed. For our purposes in salvaging the tenpenny nail machine crankshaft a hard steel wire good machinability was necessary and we selected SPRASTEEL #25. The shaft is sprayed to a thickness of .050 in. on a side measured from the tops of the threads. This operation requires approximately 10 pounds of metal, takes about 1½ hours, and the total cost including oxygen, acetelyne, compressed air, metal, and labor is approximately $7.10.

✦ ✦ ✦

WE finish by machining, using a high speed tool bit, ground in accordance with the metallizing equipment manufacturer's recommendations. We remove approximately .020 in. of metal, an operation which takes about 1½ hours and costs $3.00.

(Please turn to Page 191)

Get Ready for the Annual.....

WORCESTER REGIONAL MEETING

at the Bancroft Hotel, Worcester, Mass., in April

As we go to press we cannot give you the details, but a top-notch meeting is being planned, the date and program for which will be announced in the April issue of Wire & Wire Products.

Meanwhile, plan to attend and if you expect to remain overnight, make your hotel reservations as soon as you receive the announcement. There will be an appetizing dinner, good fellowship and an excellent technical session.

Please advise us that you will attend so that we can make the necessary dinner reservations with the Hotel, which be the Bancroft, as heretofore.

THE WIRE ASSOCIATION

RICHARD E. BROWN—Executive Secretary

300 MAIN STREET STAMFORD, CONN.

Barb Wire Collection

By Jewell Ross Davis,
Director of Public Relations,
Northwest Missouri State Teachers College, Maryville, Mo.

An historical sketch of the development of barb wire to the important places it occupies in our economy in peace and war ✦ ✦ ✦ ✦

ANTIQUE collectors revel in secondhand stores, book lovers search dusty shelves, archeologists dig deep into mounds and river beds; but few collectors scan the fences of pastures along the highways to add to their hobby collection.

✦ ✦ ✦

DR. FRANK HORSFALL, of the department of agriculture at Northwest Missouri State Teachers College, collects, among other old agricultural equipment, samples of barb wire. The college now owns 105 varieties.

✦ ✦ ✦

TO many people barb wire is just a cheap fencing material which father untwisted when he could not find handy a piece of bailing wire and used to mend everything from harness to the windmill, not an article to be prized. But agricultural history shows that barb wire influenced the settlement of the great American plains.

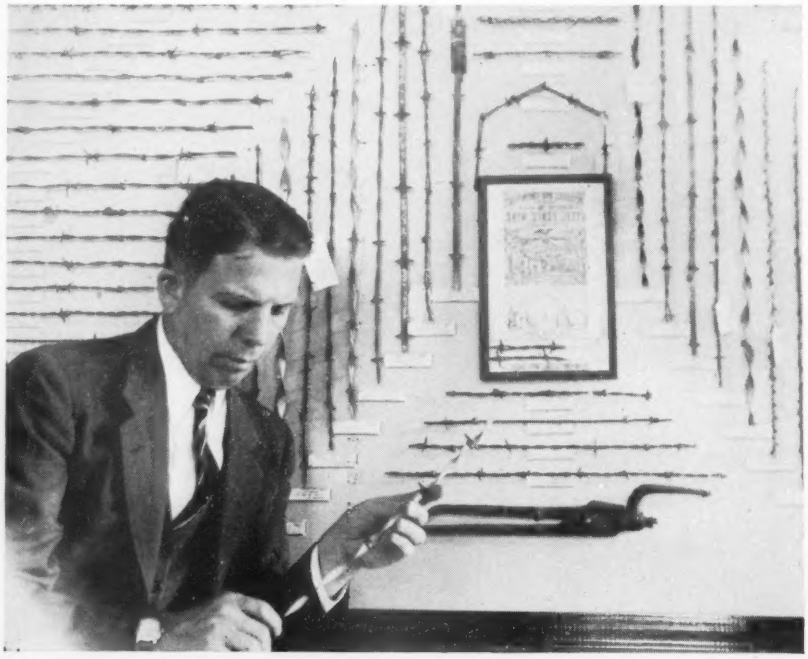
✦ ✦ ✦

AS Americans owned land and desired safety from intruders, different types of inclosures developed. Among these the stone wall fence in New England and the split rail fence in Missouri.

WHEN men moved further west, they came to the prairies where neither of these materials existed and shipping of timber made the cost prohibitive. So settlement of the vast plain country awaited the making of a cheaper fencing material.

✦ ✦ ✦

THE year 1874 marks the beginning of a new fencing era, bringing in its wake the bloodshed of feuds between neighbors but also leaving behind better breeds of cattle, smaller farms, cheaper and better productions, including better grass and better management.



Dr. Frank Horsfall examines a piece of Brinkerhoff wire patented in 1879 and found on a nearby Iowa farm. ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦

ON October 27, 1873, **Joseph F. Gliddin** of DeKalb, Illinois, applied for patent on a barbed wire fence, and on December 22, 1873, Jacob Haish contested the patent. For twenty years, the two lawed over the patent with reversals but in 1897, the United States Supreme Court issued a final decision establishing the claim of Gliddin. Among the patents which have been of benefit to mankind, there is listed in the main lobby of the patent office of Washington, D. C., No. 157,124 granted to **Joseph Gliddin** on November 24, 1874, for a wire fencing.

✦ ✦ ✦

EVEN as early as 1867 **Lucent B. Smith** of Kent, Ohio, received a patent for a wire fence with projecting barbs and in July, 1867, **D. Hunt** of Scott City, New Jersey, received a patent for a wire equipped with spur wheels. **Michael Kelly.** New York, February 11, 1868, patented a "thorny fence", armed with perforated elongated diamond shaped two point flat barbs. These started the ball rolling but for six years little was done with the patents, all perhaps too complicated for successful manufacture.

(Please Turn to Page 190)

✦ GOVERNMENT WIRE PRODUCTION INFORMATION ✦

Welding Electrode

THE WPB has announced revocation of Limitation Order L-318, which had set standards for the manufacture of all spot welding electrodes.

✦ ✦ ✦

UPON investigation it was found that the standards prescribed under the order were not readily adaptable to the types of resistance welding equipment used in most aircraft construction. Manufacturers of electrodes are now free to produce any types required by their purchasers but will continue to function under the applicable CMP regulations covering their industry.

✦ ✦ ✦

Cadmium Restrictions Modified

THE War Production Board has announced a revision in its procedures for allocating cadmium and controlling the use of cadmium products, for the purpose of greater simplification. The amended order describes the permitted uses for cadmium and cadmium products in broad general terms rather than prohibiting the use of specific items, as was the case with the old order. The new procedures were effected by amending General Preference Order M-65 and revoking General Preference Order M-65-a. The amended order frees persons using 100 pounds a month or less cadmium from the requirement for filing requests with WPB.

✦ ✦ ✦

Schedule III of CMP Regulation No. 1 Revised

ON February 2nd the WPB revised Schedule III of Controlled Materials Plan Regulation No. 1 dealing with the time for placement of authorized controlled material orders for copper.

SCHEDULE III indicates the number of days in advance of the first day of the month that orders must be placed with producers in which delivery of controlled materials is required.

✦ ✦ ✦

THAT portion relating to wire and cable products follows:

COPPER	No. Days in Advance
Wire and Cable products:	
Bare wire and cable	35
Weatherproof wire and cable	35
Magnet wire	35
Rubber insulated building wire	35
Paper and lead cable	40
Varnished cambric cable	35
Asbestos cable (type H-F)	60
Rubber insulated wire and cable (Mold or lead cured)	45

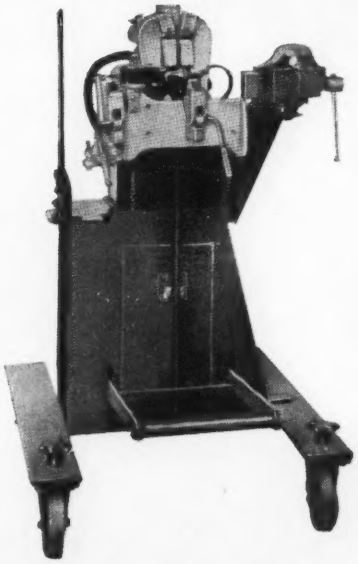
(Please turn to Page 180)

MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

CONTINUOUS IMPROVEMENT

MICRO-WELDERS with dial indicating annealing attachments are now available for high carbon wire.

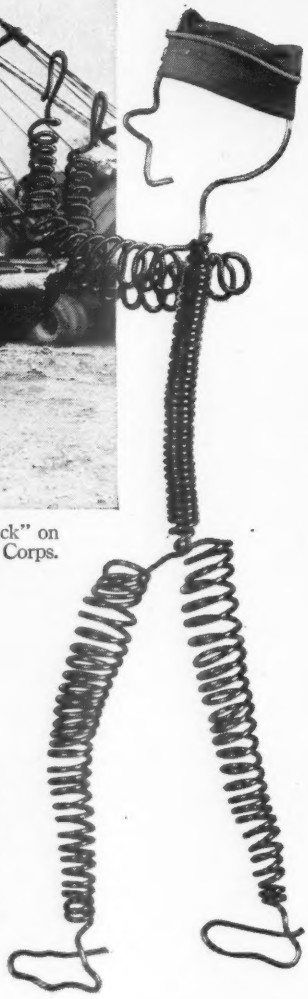
There is positive control of annealing temperature and already hundreds of these special MICRO-WELDERS are proving their dependability and satisfactory performance with leading manufacturers.



MICRO PRODUCTS COMPANY
20 NORTH WACKER DRIVE, CHICAGO 6, ILL.
Telephone, State 7468

Helping Unload a "Duck"....

Unloading troop rations from an amphibious "Duck" on New Caledonia. Photo by U. S. Army Signal Corps.



KEYSTONE

Wire

As easily and quickly as a mother lifts a baby from a cradle, this mobile crane, equipped with strong wire cables, unloads a huge slingfull of vital army rations from an amphibious "Duck". Here again, WIRE fulfills an important role on the fighting fronts—helping deliver *food* to our fighting men. This is but one of thousands of ways in which wire production is adding impetus to the invasion.

But even though most of our present industrial wire production is working for Victory, we are making preparations for the postwar market. Because of many new uses for wire and vastly improved fabricating techniques, we suggest you consult our engineers immediately regarding the use of wire in *your* civilian products.

KEYSTONE STEEL & WIRE CO.
PEORIA, ILLINOIS

Special Analysis Wire for All Industrial Uses

SAMSON SPRING WIRE

Sell your scrap today . . . help bomb the Axis!

Government Wire Production Information

(Continued from Page 179)

WPB Drops Ratings On Insect Screen Cloth

THE War Production Board announced on February 10th that preference ratings of AA-3 or less on civilian purchase orders for steel insect screen cloth are to be disregarded, to provide equitable distribution of this product for civilian use. Such purchase orders are now to be treated as unrated orders.

✦ ✦ ✦

PRODUCTION of this type of steel screen cloth for civilian use is now at the rate of half of normal yearly production. To effect equitable distribution of this limited output, order L-303 (issued December 13, 1943) required producers to supply civilian needs without regard to the customers' size, location, or affiliated outlets. However, some orders carry preference ratings of AA-3 or less and some are unrated, and it was found that this situation seriously interfered with the distribution required by the order.

✦ ✦ ✦

THE amendment, issued and effective February 10, remedied this difficulty by placing all civilian purchase orders on the same footing, irrespective of whether they were originally rated AA-3 or less, or unrated.

✦ ✦ ✦

Forms Changed for Persons Dealing in Rough Diamonds

A REVISION in the forms required from persons dealing in rough diamonds has been announced by the WPB. The changes are in line with WPB policy to lighten paper work, but the move represents no relaxation in existing controls.

✦ ✦ ✦

REPORTS on stocks on WPB Form-749 now will be required only from persons having a total stock of 250 carats or more, and will not be required from ultimate

consumers. Another change in this quarterly report is the elimination of the requirement to furnish records of sales made during the quarter.

✦ ✦ ✦

REPORTS of sales on WPB Form-751 now will be required only from sellers of 25 carats or more of diamonds and 100 carats or more of bortz, the lowest grade of diamond, usable only for crushing. WPB Form-750, on which are reported small sales and imports, has been changed to conform to the changes made in WPB Form-751.

✦ ✦ ✦

THESE changes were made effective by amending General Preference Order M-109 which also contains a new provision prohibiting sales of industrial diamonds for cuttable uses except with WPB permission.

✦ ✦ ✦

WPB Issues Modification of Rules Governing Rejected Stainless Steel

RULES governing replacement of stainless steel rejected by a customer for non-conformity with specifications or for other defects have been made identical with those rules governing replacement of other types of steel. This means that when stainless steel is rejected, the producer must make the replacement in preference to all other orders for similar material, excepting in cases where WPB or the customer gives specific instructions to the contrary, without seeking an additional allotment. If any portion of rejected stainless steel can be used by the producer to fill another authorized controlled material order or for permissible delivery under any other WPB order or regulation, it may be so used. This action is taken in Direction No. 16 to CMP Regulation No. 1, as amended February 1, 1944.

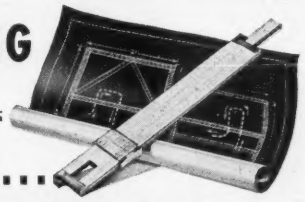
✦ ✦ ✦

Manufacture of Upholstery Springs Now Possible

MANUFACTURERS of upholstered wood furniture, who have been resorting to wooden springs, various types of padding, and other devices for more than a year to make up for the lack of steel springs, have been granted permission to resume the use of a limited quantity of steel springs, the War Production Board has announced. The new products will probably be on the market in March. The use of steel springs is limited by the wood furniture order (L-260), which has been amended to include upholstery springs as essential metal parts. Provision has been made to permit each manufacturer to use for such essential metal parts, in each quarter of the year, 12½ per cent of the quantity of springs that he used in the year 1941. The percentage will be measured on the basis of dollar value. The order (L-135) prohibiting production of steel springs for upholstered furniture has been revoked.

(Please turn to Page 182)

OVEN ENGINEERING NEWS



Wherever You See This Nameplate . . .

You'll Know That { 1. Production has been increased. 2. Cost has been reduced.

A lot of people are beginning to wonder what we **do** make, because we seldom advertise the same equipment twice. The answer is simply that we make **anything** in the field of oven materials handling and processing. We suggest that you keep the following list and call us when you have a production problem. We design standard and special equipment for:

WIRE INDUSTRY

Complete insulation lacquering systems*
Constant tension, variable speed windup machines*
Continuous windup and unwind systems*
Friction payoff stands*
Saturation systems
Lacquer pots*
Drying and preheating rooms*
Experimental solvent resin systems*

FERROUS WIRE AND ROD

Dehydrogenizing ovens
Welding rod coating ovens*

HEAT TREATING

Draw furnaces*
Dehydrogenizing ovens*
Aging ovens*
Blueing ovens
Thermal shock systems*

**Indicates standard sizes and types of these units are available.*

FREE DATA

Much of the above listed equipment is fully described in our FREE engineering book, "Blueprint for Industry—Part II".

(This is No. 8 of a series. Reprints of previous advertisements will be sent free upon request.)

THE INDUSTRIAL *Oven Engineering* COMPANY
11621 Detroit Avenue **Cleveland, Ohio**

Government Wire Production Information

(Continued from Page 181)

Enamel Wire Naptha

WITH outstanding AA-1 rated orders calling for twice the available supplies of enamel wire naptha, this critical chemical, deliveries of which recently have been controlled by directives, has been placed under full allocation procedure by inclusion in the Miscellaneous Chemicals Order (M-340).

✦ ✦ ✦

SMALL order exceptions permit delivery of up to 54 gallons of raw naptha by any supplier to any one customer in any one calendar month, without special authorization by WPB.

✦ ✦ ✦

Copper and Copper Base Alloys

RESTRICTIONS on use of copper and copper base alloys have been lifted in two instances—for production of lubrication equipment and for renewable electric fuses and electric wiring devices. Manufacturers expect an enormous saving in man hours and a more satisfactory product as a result.

✦ ✦ ✦

Bid Form

STANDARD Procurement Form No. 1, a simplified contractors' bid form to be used in purchase of goods and services under fixed-price supply contracts, has been developed and placed in use by the Army.

✦ ✦ ✦

Chrome and Nickel

CHROME and nickel may now be used without restriction in manufacture of valves for new engines that will go into expanded 1944 truck production program.

Canadian Regulation Changes

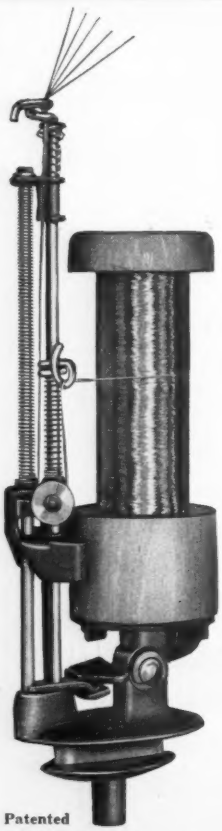
RESTRICTIONS on the use of steel wire and wire rod have been removed by an order issued jointly by the Department of Munitions and Supply and the Wartime Prices and Trade Board.

✦ ✦ ✦

LIFTING of the restrictions will enable manufacturers to produce more hay baling wire, stove pipe wire, box strapping wire and other items in short supply.

✦ ✦ ✦

UNDER Administrator's Order No. A-1034, Wartime Prices and Trade Board, Order No. A-731 is replaced. The new Order states that no person shall manufacture barbed wire except (a) in a weight of 57 pounds per 80-rod reel, or 58 pounds gross shipping weight including the reel; (b) in two strand; (c) of No. 14 standard wire gauge (0.080 inches diameter); (d) in 4 point barbed with barbs 6 inches



Patented
2 BX - Special
MOSSPEED Carrier.

MOSSPEED BRAIDER CARRIERS
FOR BRAIDING
MULTIPLE ENDS OF FINE WIRES

A special design MOSSPEED CARRIER and BOBBIN is supplied for braiding "SHIELDED" WIRE & ETC.

Will braid multiple ends of fine aluminum, brass, bronze or copper wire, Etc.

SHEAVE-WHEEL on braider-stop and SPECIAL-THREADEYES on carrier, together with new type BOBBIN provides an even wire "let-off" resulting in a high quality and uniform braided shield.

Consult our engineers regarding your braiding problems.

MOSSBERG
Pressed Steel Corp.
18 West Street
Attleboro, Massachusetts, U. S. A.
European Agent
James Day (Machinery), Ltd., "Ford House", 88 Regent St., London, W. I., England
Ross Whitehead & Co., Ltd., Montreal and Toronto, Canada.

apart made of No. 16 standard wire gauge (0.064 inches diameter).

✦ ✦ ✦

THE clause requiring the manufacture of two strand only does not prohibit the manufacture of single strand barbed wire to the order of the Department of Munitions and Supply. The provisions of the Order are subject to exemptions in individual cases of undue hardship or other special circumstances.

✦ ✦ ✦

MANUFACTURE of armored cable (BX Cable) will be allowed under Order A-1013.

✦ ✦ ✦

AS the supply of steel strip necessary for the manufacture of BX Cable is now available. Order A-552, which prohibited its manufacture is revoked. The new order is effective immediately.

✦ ✦ ✦

ACP Issues New Technical Service Data Sheet

AMERICAN Chemical Paint Company, Ambler, Penna., has released a new technical service data sheet on pickle bath toners.

✦ ✦ ✦

THIS defines what these chemicals are, what they do, and conditions under which they should be used. Besides this, the grades of ACP pickle bath toners available are described, and a description of how to use them is included. This is Sheet No. 13-15-1-2, and may be had on request.

✦ ✦ ✦

New Catalog On Metal Forming Machines

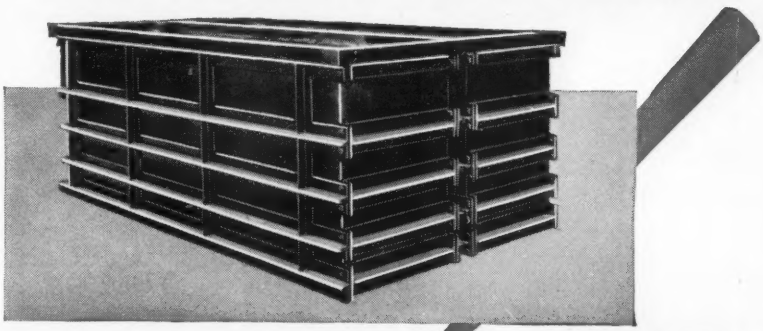
O'NEIL-IRWIN Manufacturing Company, Minneapolis, 15, Minn., have enjoyed such an extension of the uses of their Die-Less Duplicating machines that they have found it necessary to design new machines to meet the problems of their growing circle of customers from year to year.

TWO of these important developments, the Di-Acro Radius Brake and the Di-Acro Bender No. 3, are described in a much enlarged catalog, just issued. The many wire product fabricators who are regularly making shapes and forms and many wire mills who have occasional jobs of this kind to do, will find this book of practical interest and value. The Company will be glad to mail a copy to interested parties on request. The full line includes a variety of benders, brakes and shears.

Folder On Shape Dies Issued By Carboloy

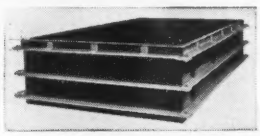
THE Carboloy Company, Inc., Detroit, 32, Michigan, has issued a four page folder entitled "Drawing Shape Wire," with information on finishing and servicing equipment for the die room. Besides covering equipment, it describes Carboloy engineering service and calls attention to the Detroit Training Course on die making, which is available to wire mill employees without cost.

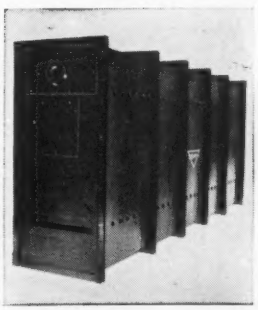
FOR PICKLING AND PLATING



HAVEG

RECTANGULAR TANKS





HAVEG is a molded plastic which is unaffected by acids, alkalies, and chemicals generally. It is *not* a lining or coating but is resistant throughout its entire mass.

Rectangular Tanks as large as 12 feet long are made in seamless one-piece units. These tanks are made in standard sizes in which the outside dimensions are multiples of 6". This standardization permits the production of an almost unlimited number of standard sizes in which no single dimension will vary more than 3" from a customer's requirement.

Bulletin F-3 gives complete engineering, design and application data on all types of Haveg Equipment, Pipe and Fittings. Send for your copy.

HAVEG-SARAN *Tubing; Pipe & Fitting.; and sheets are available from stock.* HAVEG-SARAN *is also described in Bulletin F-3. Send for a copy now.*

HXP-43

HAVEG CORPORATION

NEWARK, DELAWARE

FACTORY—MARSHALLTON, DELAWARE

CLEVELAND 550 Leader Building | CHICAGO 1201 Palmolive Building | DETROIT 2832 E. Grand Blvd. | LOS ANGELES 601 W. Fifth St.

A Review of Recent Wire Patents

No. 2,338,130, WIRE WINDING MACHINE, patented January 4, 1944 by David B. Parkinson, Maplewood, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York.

More specifically, this machine and method are for tightly winding the field coils on the poles of laminated field structures of small electric motors.

✦ ✦ ✦

No. 2,338,202, WIRE TESTING APPARATUS, patented January 4, 1944 by Raymond L. Reading, Maywood, Ill., assignor to Belden Manufacturing Company, Chicago, Ill., a corporation of Illinois.

This device is adapted for testing the softness or winding ability of wire.

✦ ✦ ✦

No. 2,338,304, ARMORED CONDUCTOR STRUCTURE, patented January 4, 1944 by James W. Schmied, Madison, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York.

Invention lies in the provision of a sheath for a pair of conductor wires, the outer layer of the sheath being a continuous series of separated strip portions, having stiffening corrugations.

✦ ✦ ✦

No. 2,338,321, METHOD OF ELECTROPOLISHING STEEL, patented January 4, 1944 by Charles L. Faust, Columbus, Ohio, assignor to Battelle Memorial Institute, Columbus, Ohio, a corporation of Ohio.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents; outside United States and Canada, $1.00. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

The method of electro-polishing steel selected from the group consisting of plain carbon and low alloy steels, comprises making the steel the anode in an aqueous solution of from 5 to 80% of sulfuric acid by weight of solution from 5 to 80% of phosphoric acid by weight of solution and from 0.5 to 20% of chromic acid by weight of solution, the combined acid concentration being above 50% but not over 90% by weight of solution, the balance being essentially water, and passing there through an electric current of a density between 50 and 1000 amperes per square foot.

✦ ✦ ✦

No. 2,338,539, MATERIAL UNWINDING DEVICE, patented January 4, 1944 by Amos L. Quinlan, La Grange Park, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

Material is unwound from a spool by being taken off from above the spool, but is unwound no faster than will retain the strand taut.

No. 2,338,795, WIRE PLATING APPARATUS, patented January 11, 1944 by Leonard G. Berquist, Niles, Mich., assignor to National Standard Company, Niles, Mich., a corporation of Michigan.

The plating solution is kept agitated and the anode of plating material rests on a plate of conducting but non-corrosive material.

✦ ✦ ✦

No. 2,339,200, PROCESS FOR PREVENTING TARNISHING OF METALS, patented January 11, 1944 by Frank J. Sowa, Cranford, N. J.

Over the metal surface is applied an aqueous solution of a film-forming hydrophilic colloid and a water-soluble wetting agent, after which the solvent is evaporated to deposit on the surface a thin continuous film of this colloid.

✦ ✦ ✦

No. 2,339,410, BANDING MACHINE, patented January 18, 1944 by Clarence J. Keller, Anderson, Ind., assignor to General Motors Corporation, Detroit, Mich., a corporation or Delaware.

This is a machine for banding a group of insulated wires. There are 16 claims.

✦ ✦ ✦

No. 2,339,589, METHOD OF AND APPARATUS FOR WINDING ROTORS, patented January 18, 1944 by Harry C. Stearns, Chicago, Ill., assignor to Products Development, Inc., Chicago, Ill., a corporation of Illinois.

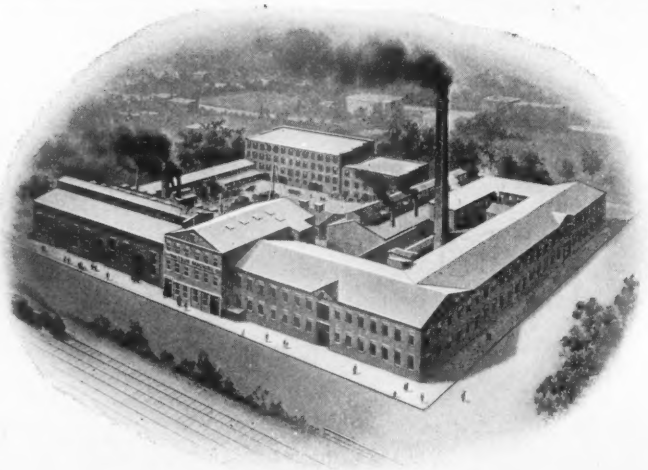
THE WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE AND WIRE ROPE MACHINERY

Stranders
Bunchers
Cablers
Closers
Armor. Machines
Tapers
Juters
Serving Heads
Compound Tanks
Saturating Tanks
Powderers and Chalkers
Capstan Sections



Let-offs
Gang-Spoolers
Re-winders
Capstan Takeups
Continuous Takeups
Heavy-Duty Takeups
Traverses
Measuring Mach's.
Testing Mach's.
Vulcanizers
Polishers
Reel Crutches

MEAS. MACH'S., TRAVERSES, REEL CRUTCHES, BUNCHERS, SMALL POWDERERS, ETC. — USUALLY CARRIED IN STOCK

LITERATURE AVAILABLE ON ALL LISTED UNITS

The method of winding a skein of wire between a pre-determined pair of slots of a rotor, comprises feeding a wire strand to a feed point adjacent the rotor and laying the wire upon the rotor, moving the rotor in a vertical direction to lay the wire into the first slot, turning the rotor to lay the wire strand across the end thereof, moving the rotor in a vertical direction to lay the wire in the second slot, turning the rotor to lay the wire across the opposite end of the rotor to carry the strand back to the starting point to complete a turn, thereupon repeating the cycle of movements until the desired number of turns of wire have been laid in the slots, simultaneously twisting the wire a complete revolution for each turn of wire laid to cause same to lay evenly.

✦ ✦ ✦

No. 2,339,683, METHOD OF MAKING RETRACTILE CORDS, patented January 18, 1944 by Thomas K. Cox, Randallstown, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

In this method of vulcanizable, extruded material is deposited upon a wire conductor, and the conductor and covering passed directly into a vulcanizing chamber to continuously vulcanize the material thereon, then coiling the cord into a helical, retractile form, and heating the cord to set the cord in this form.

✦ ✦ ✦

No. 2,340,238, CHROMIUM IRON ALLOY, patented January 25, 1944 by Joseph J. Vetter, Hackensack, N. J., assignor to Natural Products Refining Co., Jersey City, N. J., a corporation of Delaware.

An alloy is provided containing 15 to 25% by weight of chromium, 1 to 3% by weight of silicon, and 5 to 6% by weight of carbon, the remainder being substantially comprised of iron.

✦ ✦ ✦

Develops New Utility Tank

A NEW type of portable heating and dipping tank, including an acid compartment and differing from ordinary dipping tanks in a number of basic respects, has been developed by the Heil Engineering Company, 12901 Elmwood Avenue, Cleveland, Ohio.

✦ ✦ ✦

KNOWN as a "utility tank" and designed for a wide variety of uses, the tank is divided into three compartments which are basically designed for degreasing, rinsing and pickling. However, it is also suited for etching, plating, metal coloring, waxing, fluxing, oiling, lacquering, dip painting, rust removing, macro and salt spray testing, anodizing, pilot and laboratory operations, and photo finishing. Because of its unusual flexibility and portability, it is suitable for any manufacturing plant, machine shop, garage, public utility or laboratory. An unusual feature is a dual purpose cover and shelf, which is thoroughly acid proofed and arranged to drain into the tank. Special linings, including steel, lead and Koroseal, the latter for use with nitric and chromic acid solutions and other oxidizing chemicals, are also supplied on request, as are many other extras, including indicating thermometers, acid-proof electric heating elements, gas fired heaters, dipping baskets, etc.

G-E Leaflet Describes Testing Device

THE General Electric Company, Schenectady, New York, has issued a circular describing a device that has been developed to test the toughness of magnet-wire insulation by an abrasion process. The applications, features, operation, and specifications of the tester are covered. Any one interested may secure a copy by asking for GEA-4166.

CENTRAL LOCATION

The new Garrett Division plant of the Hubbard Spool Company is well located for shipment to all wire mills. Flanged steel drums for traverses* are one type of Hubbard product being manufactured at Garrett, Indiana now. Your inquiry is invited concerning price and delivery.

*Under license arrangement with the Western Electric Co., Inc.

HUBBARD SPOOL COMPANY

1624 CARROLL AVENUE | CHICAGO 12, ILLINOIS

Since 1912, manufacturers of wire drawing, annealing, and shipping spools and reels.

Outstanding Personalities of the Wire Industry

B. S. Chapple, Jr., Made Assistant to President

APPOINTMENT of **Bennett S. Chapple, Jr.**, as assistant to the president of the Firth-Sterling Steel Company, of McKeesport, Pa., was announced on February 2nd by **L. Gerald Firth**, president of the company.

✦ ✦ ✦

MR. Chapple comes to Firth-Sterling from a position as assistant manager of sales of the New York district of the Carnegie-Illinois Steel Corporation, whom he previously served as manager of sales promotion and, later, in charge of emergency defense coordination with the title of assistant to the vice president in charge of operations.

✦ ✦ ✦

PRIOR to his association with Carnegie-Illinois, Mr. Chapple was secretary and sales manager of the Insulated Steel Construction Company of Middletown, Ohio, and was for a time also a member of the development department of the American Rolling Mill Company.

B. S. CHAPPLE, JR.

American Steel & Wire Personnel Changes

AFTER more than 50 years association with the American Steel & Wire Co., **Fred Ingraham** has retired as manager of operations of the Chicago district. **Harry H. Lumley** has been named to succeed him, having been assistant manager of operations in the Chicago district for four years, prior to which he was manager of operations of the Duluth district.

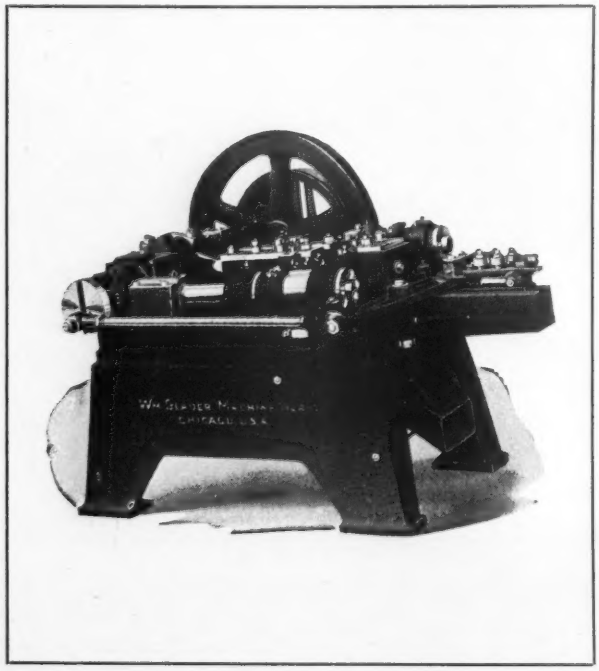
✦ ✦ ✦

ROBERT MURRAY has been appointed assistant division metallurgist at Cleveland, Ohio.

✦ ✦ ✦

BORN in Paisley, Scotland, Mr. Murray has been a United States citizen since 1920. He received his education in Paisley and at Glasgow Technical College. His

GLADER HIGH SPEED WIRE NAIL MACHINE



High tonnage output, and low maintenance costs, have resulted in Glader Machines being accepted as standard equipment in every large nail mill built in the United States in the past twenty years.

Glader Machines are operating in most of the wire producing mills throughout the world.

These machines are made in eleven different types and sizes. This enables us to cover the range of sizes of nails produced with the greatest efficiency.

For further information please address,

WM. GLADER MACHINE WORKS

210 NO. RACINE AVE.
CHICAGO, ILLINOIS

first employment with the Wire Company was in October, 1920, as a sample clerk at South Works in Worcester, Mass. In February, 1922, he was transferred to New Haven as a pyrometer checker in the patenting and galvanizing department. He worked his way up through the ranks and was named assistant superintendent in August, 1938, and superintendent in February, 1941, which post he has held to the present time.

✦ ✦ ✦

EDWIN E. CASPELL has been named superintendent of the New Haven works, succeeding Mr. Murray.

✦ ✦ ✦

MR. CASPELL was born in Cleveland, Ohio, and was educated in the public schools there before entering the University of Cincinnati College of Engineering from which he was graduated with an M.E. degree. He worked for various Cleveland plants of American Steel and Wire for numerous short periods while attending college and upon his graduation became permanently associated with the company when he was made a technical apprentice at New Haven in November, 1932. He has held various positions and since August, 1938, has been general foreman of the rope mill at New Haven.

✦ ✦ ✦

ARVIN P. WIEDEMANN has been made general foreman of the rope mill at New Haven, replacing Mr. Caspell.

✦ ✦ ✦

MR. WIEDEMANN was born in New York City and is a graduate of Yale University, having received a B.A. degree. He has been associated with the American Steel and Wire Company since March, 1937, and since April, 1940, has been assistant general foreman of the rope mill at New Haven.

✦ ✦ ✦

Arthur H. Quigley, Chairman of the Board, Anaconda Wire & Cable Co.

ARTHUR H. QUIGLEY, executive vice president of American Brass Co., has been elected chairman of the board of Anaconda Wire & Cable Co., it was announced recently by **Clark Judd**, president of American Brass, a subsidiary of Anaconda Copper Mining Co.

✦ ✦ ✦

MR. QUIGLEY, elected to his new position by Anaconda Wire & Cable Co. directors in New York, will transfer his office from Waterbury to New York immediately.

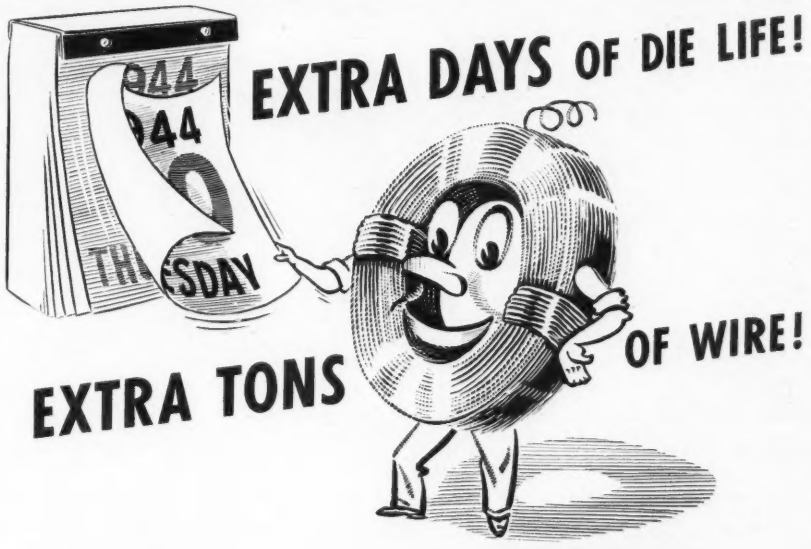
✦ ✦ ✦

MR. QUIGLEY, a native of Connecticut who entered the employ of American Brass on the same day as did Mr. Judd in 1902, formerly was stationed at the firm's Kenosha, Wis., plant.

✦ ✦ ✦

NEWLY - ELECTED directors for Anaconda Wire & Cable Co. are: **C. F. Kelley, J. R. Hobbins, John A. Coe, Clark S. Judd** and **W. H. Hoover. W. K. Daly** and **James Dickson** have resigned as directors.

(Please turn to Page 188)

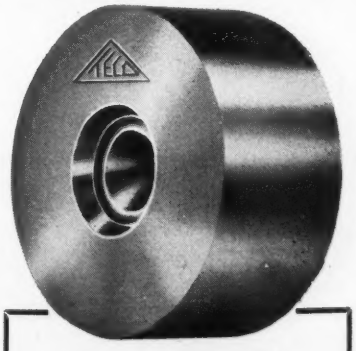


Every minute of extra working life you get with TECO Carbide Dies, ticks off greater tonnage. You get more productive time from your machines because you waste less time for die changes.

TECO Cemented Carbide stays on the job longer because it is harder, denser, more uniform — therefore more resistant to wear and friction.

Let a test run prove how TECO Carbide Dies can improve your production — in speed, in accuracy, in smoothly-finished tonnage. Our engineers are glad to discuss your needs.

TUNGSTEN ELECTRIC CORPORATION
564 39th STREET UNION CITY, N. J.
Branch Office: 2906 Euclid Ave., Cleveland, Ohio
Representative: Architects & Builders Bldg., Indianapolis, Ind.



WIRE and BAR DIES
EXTRUDING DIES
TUBING DIES • SIZING DIES
Also Carbide Blanks, Tools, Bits, Reamers and Forming Tools

TECO Pioneers in Tungsten Carbides for over a Quarter Century **CARBIDE DIES**

Outstanding Personalities of the Wire Industry

(Continued from Page 187)

H. H. Horsfall, Chairman of the Board, Canada Wire & Cable Company

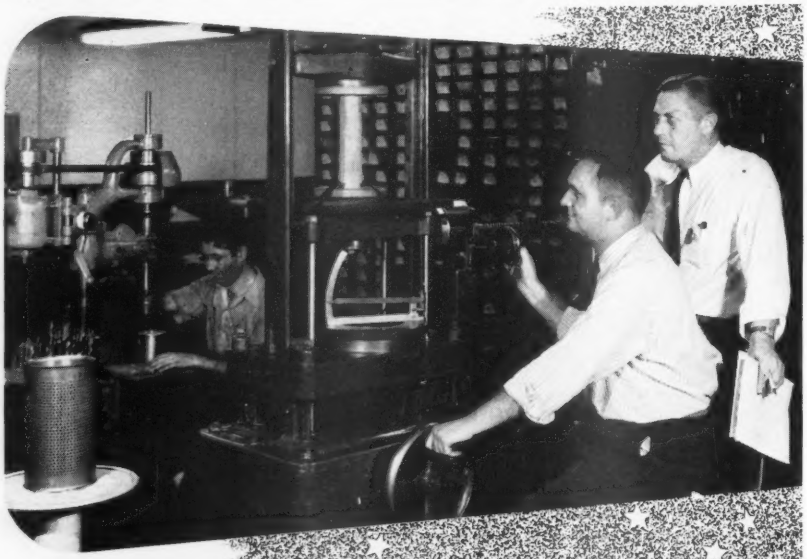
THE election of **James Y. Murdock** as president of Canada Wire & Cable Co., of Toronto, was announced recently. He succeeds **H. H. Horsfall,** who becomes chairman of the board. **W. C. Bennet,** president of Phelps Dodge Refining Co., has been named a director of Canada Wire.

Charles H. Reinert, Mgr. of Operations, Steel & Tube Div., Republic Steel Corp.

CHARLES H. REINERT was recently appointed to the position of manager of operations of the steel and tube division of Republic Steel Corp.

✦ ✦ ✦

MR. REINERT succeeds **Henry Wick** who has held the same position since 1932 and has resigned to become vice president of Plastic Manufacturers, Inc., Stamford, Conn.



TO MAKE THEM BETTER
for the job you want done!

Today as always Hubbard research in spool and reel design and construction continues. While now concerning many products for use in the war, the information being gathered is adding to the fund of practical data that guide all Hubbard recommendations and production.

The constant application of those factors determined by Hubbard laboratory research is your assurance that Hubbard spools and reels will continue to be better for the job you want done.

HUBBARD SPOOL COMPANY
1624 CARROLL AVENUE | CHICAGO, ILLINOIS
Since 1912, manufacturers of wire drawing and annealing, and shipping spools and reels.

L. A. Ver Bryck, New York District Sales Mgr., Pittsburgh Steel Company

L. A VER BRYCK has been made New York District Sales Manager for Pittsburgh Steel Co. Mr. Ver Bryck has been the Company's Washington, D. C., Sales Representative since 1942 and previously was Pittsburgh District Sales Manager. **W. F. Boore**, who has been Acting District Sales Manager at New York, has been made Assistant Manager of Sales, Steel & Wire Products, at the Company's general office in Pittsburgh. **Jos. G. Smith,** who has been Acting District Sales Manager of the Pittsburgh District Sales Office has been made District Sales Manager at that office. **W. J. Meyer,** from the Company's Tubular Sales Order Section in Pittsburgh will assist Mr. Ver-Bryck in New York Office.

✦ ✦ ✦

New Appointments by J. & L.

WILLIAM J. CREIGHTON was made executive vice president of the Jones & Laughlin Steel Corporation, Pittsburgh, Pa., by action of the board of directors on February 7th and **Adam J. Hazlett** was appointed general manager of sales. Mr. Creighton entered the employ of J. & L. as a clerk in 1900 and became financial vice president in 1928 when he was elected a director of the corporation and a member of its executive committee. Mr. Hazlett, after graduation from college, was employed by West Penn Steel Company in the sales department, later became sales manager and then president of Eastern Rolling Mill Company, and came to J. & L. in 1938 as manager of strip and sheet sales.

✦ ✦ ✦

Wickwire Spencer Aviation Appoints New Executive Vice President

MR. E. P. HOLDER, President of the Wickwire Spencer Steel Company has announced the appointment of **Lt. Col. Cecil P. Young,** U.S.A. Ret., as Executive Vice President of the Wickwire Spencer Aviation Corporation, a

subsidiary of Wickwire Spencer Steel Company. The Wickwire Spencer Aviation Corporation is best known for the pioneering and development of the sensational new Wickwire Spencer Fully Automatic Variable Pitch Propeller. It is reported that this propeller results in greater safety and greatly increases the available power of every plane on which it is installed. Lt. Col. Young will be located at Chicago where the company's Blue Island Plant is located.

✦ ✦ ✦

V. A. Sheals Appointed Designing Engineer

VINCENT A. SHEALS has been appointed Designing Engineer of the Cable Engineering Division of General Electric's Schenectady Works.

✦ ✦ ✦

A NATIVE of Brushton, New York, and a graduate of Union College in 1921 with a BS degree in electrical engineering, Mr. Sheals became affiliated with the Company in September, 1921, as a student engineer in switchboard testing. In 1923 he transferred to the general office as a cable engineer in the cable engineering division, Central Station Divisions, and in January, 1930, he joined the staff of the New York Office as district cable specialist.

✦ ✦ ✦

IN 1939, Mr. Sheals returned to Schenectady as assistant designing engineer of the cable engineering division, a position he retained until his recent appointment.

✦ ✦ ✦

J. P. Lawrence, President, American Monorail Company

J. P. LAWRENCE, formerly vice president and general manager of the American MonoRail Co., Cleveland, was made president following the retirement of **H. M. Miller,** who is now chairman of the board. Other officers are: **F. C. Harris,** vice president and chief engineer; **C. deV. Miller,** vice president and sales manager; **J. L. Pischke,** secretary and treasurer.

NILSON AUTOMATIC PRESS AND FOUR SLIDE MACHINE

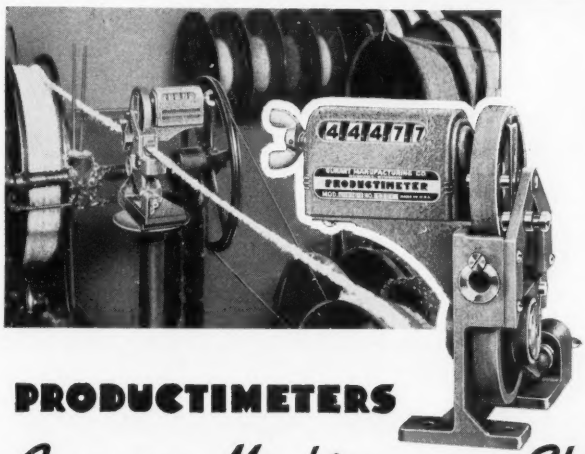
FOR SWAGING, STAMPING, PIERCING, BLANKING, FORMING OF COILED METAL

WE also build machines for forming Paper Clips, Buckles, Gate Hooks, Coat and Hat Hooks, Ceiling Hooks, Wire Ears, Cable Rings, Screw Eyes, Sash Chains, Automobile Side Chains, Flat Open Link Chains, Staples, Cotter Pins, Hose Clamps, Etc., and Wire Straighteners, Wire Reels, Frame Bending Machines and Special Presses.

For Complete Details Address —

THE A. H. NILSON MACHINE CO.

BRIDGEPORT, CONN., U. S. A.



POPULAR L-16 LINE includes models with three types of reset: Wing-nut, Tumbler Lock and Quick Lever. L-H-16 operates up to 500 ft. per min. and L-HDW-16 up to 2000 ft. per min. L-R-16 is equipped with Predetermined Counter to provide a signal at the end of a pre-set number of feet.

PRODUCTIMETERS *Increase Machine Efficiency*

Production and more production is demanded from every machine in the wire industry. But that is not enough . . . this production must be counted . . . measured . . . accurately . . . automatically . . . as an integral part of machine operation.

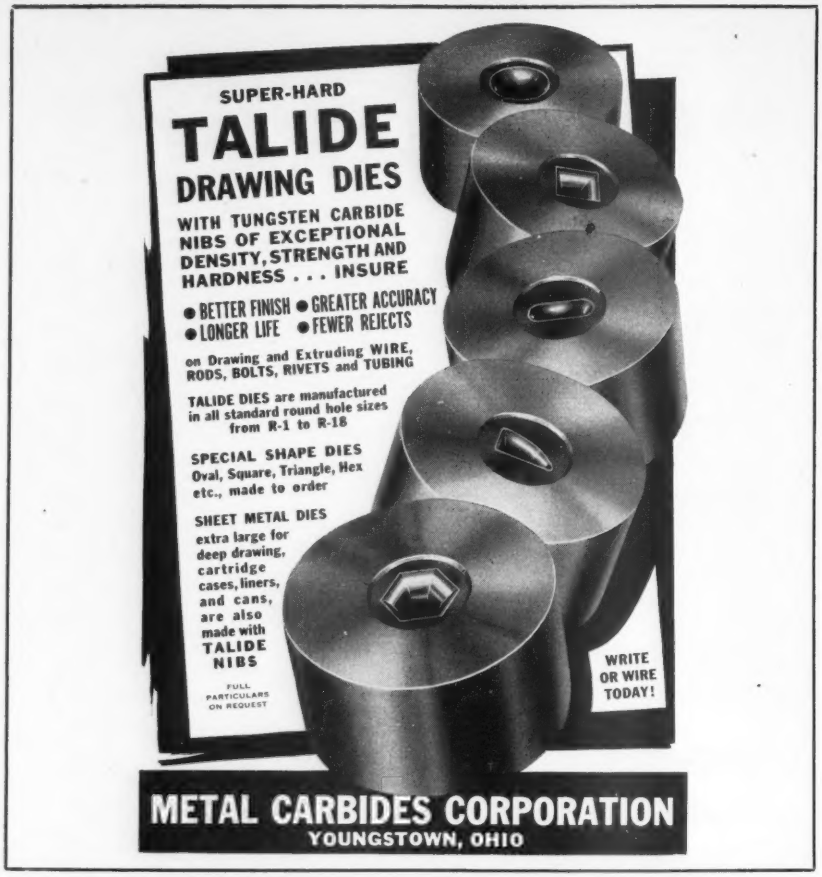
Productimeters give you this accurate count . . . the line includes units for every wire measuring requirement . . . for every type of material: Insulated Cable, Wire, Rope, Chain, Braid, Bare Copper Cable, rough-surfaced Conductor . . . greasy, oily wire . . . and they're rugged, built for day-in-day-out service.

If you have a wire measuring problem, write our Engineering Department for recommendations . . . they're backed by 64 years' experience in the exclusive manufacture of counting and measuring devices.

Bulletin No. 3 sent at your request

DURANT MANUFACTURING COMPANY

1918 N. Buffum St., Milwaukee 1, Wis. 176 Eddy St., Providence 3, R. I.


SUPER-HARD
TALIDE
DRAWING DIES
WITH TUNGSTEN CARBIDE NIBS OF EXCEPTIONAL DENSITY, STRENGTH AND HARDNESS . . . INSURE
● BETTER FINISH ● GREATER ACCURACY
● LONGER LIFE ● FEWER REJECTS
on Drawing and Extruding WIRE, RODS, BOLTS, RIVETS and TUBING
TALIDE DIES are manufactured in all standard round hole sizes from R-1 to R-18
SPECIAL SHAPE DIES
Oval, Square, Triangle, Hex etc., made to order
SHEET METAL DIES
extra large for deep drawing, cartridge cases, liners, and cans, are also made with TALIDE NIBS
FULL PARTICULARS ON REQUEST
WRITE OR WIRE TODAY!
METAL CARBIDES CORPORATION
YOUNGSTOWN, OHIO

New!

ROLLING MILL CATALOG

Just off the press! "Standard" Rolling Mill Catalog RM describes the full line of "Standard" Rolling Mills—for precision rolling, strip and ingot reduction, sizing and embossing,—also for grading, cross and pinch rolling and other operations. Available with heavy duty staggered type roller bearings or plain bearings, these "Standard" Mills are carefully engineered. This new catalog will help you select a machine to fit your needs.—Call upon us for engineering recommendations.

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Please send your new Rolling Mill Catalog
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SEND FOR IT NOW!

STANDARD MACHINERY CO.
PROVIDENCE 7, RHODE ISLAND

Barb Wire Collection

(Continued from Page 178)

SOME authorities give the County Fair credit for the expansion of the industry. It was at a county fair in DeKalb, Illinois, in 1873, **Jacob Haish, Joseph Gliddin** and **Isaac L. Ellroad** stood looking at a wire patented by **Henry N. Rane** on May 13, 1873, in Waleman Station, Illinois. "Wooden strip with metallic points". The next year the fireworks started.

✦ ✦ ✦

THE Gliddin patent of 1874 has always held and still occupies a leading place, for years its closest competitor being Haish's "S" barbed wire. Both had twisted wires, the difference being in the way the barb was attached.

✦ ✦ ✦

OF the near four hundred patents for barb wires recorded, many were never made in commercial quantities. The College exhibit of 105 varieties is probably the largest collection, outside of that of the American Steel and Wire Company and the National Patent Office.

✦ ✦ ✦

AROUND 70% of its specimens came from farms in Nodaway county, where the College is located, or from nearby counties.

✦ ✦ ✦

EVERY possible variation of twisting barbs around one wire or two seems to have been patented during the barb wire boom.

✦ ✦ ✦

THE Kelly of 1868 was found near Wilcox. One of the two twisted wires runs through a diamond shaped piece of steel which has sharp points.

✦ ✦ ✦

THE Kennedy wire of 1874 has a steel piece with three barbs or spikes on it, clamped around a heavy wire.

✦ ✦ ✦

THE Gliddin wire of 1874 fashioned very much as wire today has a double barb made of one

wire wrapped twice around a single strand of the two twisted wires.

✦ ✦ ✦

A TWO chain link, patented by **J. W. Griswold** in 1892, commanded attention. The ends of the 4½ inch links are twisted to leave barbs standing at right angles to the links.

✦ ✦ ✦

THEN there's the spur wheel, as its name says—a wheel with sharp pointed edges fastened to one of the twisted wires.

✦ ✦ ✦

THE barb wire entanglement type of the American Army in World War I surrounds a farm near Liberty. This is a heavy wire with barbs less than an inch apart. But even more vicious is that used by the Russians in trench warfare.

✦ ✦ ✦

ACCORDING to Horsfall, often the farmer of the late 1800's strung a single or double wire and then by hand attached the barbs.

✦ ✦ ✦

Stretching the Life of a Nail Machine Crankshaft Through Metal Spraying

(Continued from Page 177)

Metallized Maintenance for Other Machines

OUR experience with metallizing has been such that we are now metallizing machine parts throughout our mill, salvaging a great deal of worn equipment. We are currently keeping expensive machine parts in good working condition, restoring crane and armature shafts to original dimensions through this process.

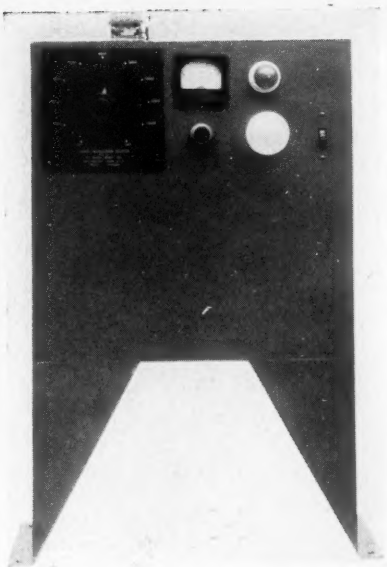
✦ ✦ ✦

ENDURING resistance to corrosion is afforded by metal spraying, and at Continental Steel, stacks have been sprayed with lead for protection from acid fumes.

✦ ✦ ✦

MANY different metals can be sprayed with a metallizing gun — from lead to high carbon and stainless steel. Wires of babbitt, bronze, copper, iron — all can contribute to top-speed production in a victory-minded wire and wire products plant.

SPARKER for SYNTHETIC EXTRUSION COMPOUNDS



THIS APPARATUS WILL LOCATE DIELECTRIC FAULTS while the wire is being insulated. When breakdown occurs, the operator is notified by an audible alarm. A resettable counter gives the number of faults in each reel. By sorting out the defective reels in this operation, the majority of the resparking is eliminated. Continuous range of voltage at the electrode is from one thousand to sixteen thousand volts. The sparker is equipped with voltmeter reading in kilovolts, and automatic interlock with the takeup motor.

R. L. Davis Electric Co.

Wallingford, Conn.

WILLEY'S DIES LAST MUCH LONGER

WILLEY'S TIPPED SHELL REAMERS

Let Willey's engineers design and build special cutting tools to fit your individual needs and machining operations. Tools "Tipped by Willey's" offer you definite price and production advantages. Good delivery. Send us your prints for quotation and delivery date.

WRITE TODAY
For
WILLEY'S CATALOG

Contains full information about WILLEY'S METAL, standard cutting tools, special tools and gages, extrusion and wire drawing dies, centerless grinder blades and tungsten carbide grinders.

And Remember
WILLEY'S DIES

We are now able to give excellent service and prompt delivery of

SMALL AMMUNITION DIES
WIRE DRAWING DIES
HEADING DIES
SHAPED DIES, TO YOUR SPECIFICATIONS

WILLEY'S CARBIDE TOOL CO.
SOLE MAKERS OF WILLEY'S METAL
1342 W. Vernor Highway Detroit 1, Michigan

FACTS ABOUT HARD FACING

with C-T "NO-WEAR" METAL

Photos show No-Wear used on dies, tongs and grooved roll.
Callite Tungsten
"NO-WEAR METAL"
a cemented carbide for hard facing

BULLETIN NO. 153 gives specific facts about Callite "No-Wear" Metal, the versatile, economical, cemented carbide for hard-facing. Illustrated are practical ways to prolong the productive life of tools, restore worn surfaces, easily and quickly.

"No-Wear" Metal has many advantages. It can be applied in thin layers over base metals, to surfaces previously "No-Wear" hard-faced, and is extremely resistant to abrasive wear at high temperatures. "No-Wear" does not oxidize nor is it readily affected by mild acids. Callite Tungsten Corporation, 572 Thirty-ninth St., Union City, N. J. Branch Off.: Chicago, Cleveland.

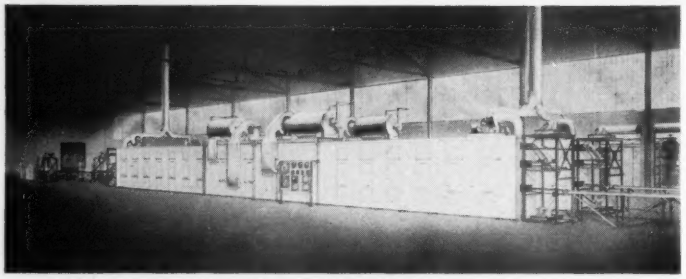
Callite "NO-WEAR" METAL
"lives up to its name"

Available in rods 14" in length, 1/4" and 5/16" in diameter. 1 lb. covers approximately 90 sq. inches; 1/32 inch thick. Hardness (Rockwell C Scale) 63-67 cast; 62-66 gas-welded. Melting point: 1300°C. (2372°F).

MORE PRODUCTION IN LESS TIME *with* CARL-MAYER FURNACES, OVENS

CARL-MAYER HI-SPEED ROD BAKER

The fastest rod baker built! Saves up to 50% in time and fuel. Patented Blow-Off Feature removes moisture without bumping or agitating the coils. **Patented and patents pending.**



WELDING ROD OVEN

For drying coated welding rods. Uses the "Mayer" Recirculating Gas Fired Air Heater principle and Rod Transfer Systems (patents pending).

Growing interest in our type of equipment is evidenced by Carl-Mayer installations in such plants as:—

Atlantic Wire Co.
Atlas Steel Co.
Eaton Mfg. Co.
Hollup Corp.
Johnson & Nephew Ltd.
Page Steel & Wire Co.
Pittsburgh Tool Steel Wire Co.
Steel Co. of Canada
Wickwire Spencer Steel Co.

WRITE FOR BULLETIN #241

THE CARL-MAYER CORPORATION 3030 EUCLID AVENUE CLEVELAND, OHIO

Development of Electrical Heating for the Wire Industry

(Continued from Page 175)

film prevents short circuiting. After the load is adjusted, it rides free of electrodes. When this film melts off, if the work accidentally touches two electrodes a safety switch acts and prevents any damage to the pieces.

✦ ✦ ✦

AS the temperature rises, the conductivity of the bath increases and, therefore, the current input in a typical installation rises approximately as follows: Bath with melting point of 1000°F. operating at 1200°F. requires 50 amperes; at 1500°F. the bath takes 71 amperes; and at 1800°F., 88 amperes. In order to control the current input, primary taps to the transformer are arranged to give lower voltages as the amperage increases with the conductivity of the bath.

✦ ✦ ✦

TO improve the starting and make greater power available, a starting coil was developed. To get absolute regulation and control of any input the adjustable electrode has been adapted on all furnaces.

✦ ✦ ✦

THESE devices on the electrode salt bath furnace greatly expedite initial heating and final close temperature regulation. With these items it becomes possible to get the maximum input from the start to final heat (making heating up time from the cold about one-third possible otherwise) and provides regulation of heat input to any degree.

✦ ✦ ✦

BECAUSE salt baths are the most stable high resistance conductors it is possible to convert all the electric energy supplied to an electrode type salt bath furnace into heat.

✦ ✦ ✦

TO calculate the heat available in calories directly from voltage and amperage readings simply multiply volts by amps which gives the watt seconds available. Since one watt second equals 0.24 of a calorie; and the number of seconds in an hour (3600) and watts in a kilowatt (1000) are known; it is

a simple matter of arithmetic to determine the time to heat any weight of metal with the available KW or to figure the rating necessary for any required hourly production.

✦ ✦ ✦

THIS heat is generated in the bath which is surrounded by insulation so that no appreciable heat need be lost from the bottom or sides of the furnace. In order to have a neutral lining a metal pot is used and this acts as a fly wheel to equalize the temperature when the load is added to the bath. The metal container also expedites the starting of the furnaces and makes closer control of input possible. When the pot is uncovered some heat is lost from radiation from the surface of the bath, the higher the temperature and greater the loss; so covers should be used over as much of the surface as is practical for convenience and the bath should be completely covered when not working.

✦ ✦ ✦

THOUGHT should be given to the relative size of the bath and work; and to the relative melting point of the bath and the operating temperature. Agitating the work as it is immersed often saves heat as it prevents "freezing" of the bath material around the cold metal. If the pot is relatively large and melting point low this is not much of a factor. However, too large a mass of cold metal in a small bath can cause heat loss due to insulating solid material forming on a load insufficiently agitated.

✦ ✦ ✦

SINCE Lavite, the first neutral salt bath, was developed by Bellis in 1917 many innovations have been made in salt bath heat treating including processes and equipment until today heat treating in salt baths is the fastest growing field of industrial heating.

✦ ✦ ✦

THE most important recent improvement is the Self Starting Electrode Furnace. By means of

(Please turn to Page 194)

Gilron

DRAW YOUR WIRE THE MODERN WAY with

GILRON COATING COMPOUNDS

A big step forward in wire drawing. Thoroughly proven in mill practice. Makes possible wire drawing speeds heretofore considered impracticable. Increases die life, prevents scratching of wire, produces better finish and eliminates use of lime in many cases.

These coating compounds are of particular value in the more difficult operations—stainless, alloy, high carbon and welding rod wire. Multiple reductions can be drawn without re-coating.

Coatings for Drawing Stainless, Alloy, Low and High Carbon and Copper Coated Wires

Let us confer with you. Write or telephone for particulars.

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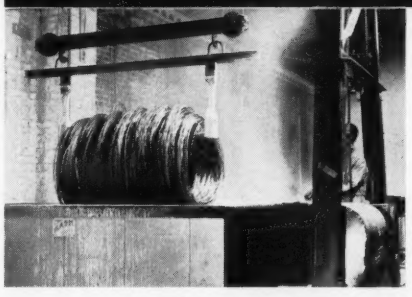
Telephone HEnderson 8375

MORRISON FLASH BAKERS



Save Time

Cut Costs

Speed Production

Fifty-three Morrison Flash Bakers now in operation in 29 plants are proving to wire manufacturers that their cost is an investment that pays dividends because of these operational features—

1—Space saving—size of a lime tank

2—Fit straight line or circle setups

3—Reduce cleaning house fog

4—Rust-free rod

5—High capacity

6—Acid brittleness recovery of about 95%

7—Rod remains on hook

8—Only a few minutes required for baking even fine wire

Descriptive Literature Sent on Request

MORRISON ENGINEERED

MORRISON ENGINEERING CORPORATION

5005 EUCLID AVENUE • • CLEVELAND, OHIO

Associate Companies: MORRISON ENGINEERING OF CANADA, LTD. TORONTO, ONTARIO — CARRIER ENGINEERING CO., LTD. LONDON, ENGLAND

NEW — AND BETTER

The *Trauwood* PROCESS

PATENTING
TEMPERING
ANNEALING

OUTSTANDING ADVANTAGES

Higher and more uniform physical and fatigue properties.

No surface decarburization or scale. Faster wire speeds . . . greater production.

Equipment fully automatic and easy to operate.

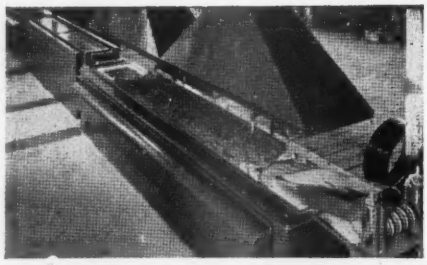
Control of heating and cooling cycles extremely accurate.

Thermal efficiency of the process very high.

Much finer grained structure possible.

High quenching temperatures rapidly attained.

Adaptable to high alloy and austenitic steel wire and strip (annealing of stainless).



Trauwood Electric Wire Tempering and Patenting Unit

The Trauwood Process, new in principle, eliminates high temperature furnaces and lead pots with their excessive maintenance costs and low thermal efficiencies. More positive temperature control is possible and quenching is done in a RISING temperature—instead of falling, as in conventional heat treating methods. The rapid rate of heating (4 to 5 times as fast as furnace heating) increases production and uniformly produces a finer grained product with higher physical and fatigue values.

Wire and rod patented by the Trauwood Process insures easier drafting and makes heavier reductions possible. In conjunction with the Trauwood patenting equipment, pickling, coating and baking can be made continuous, eliminating expensive handling and delay, materially reducing costs as compared with ordinary methods.

Complete details of the Trauwood Process will be furnished you on request. Our engineers will help you solve your continuous wire and strip patenting, tempering, and annealing problems. Write today.

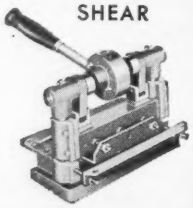
THE TRAUWOOD ENGINEERING COMPANY

1740 E. 23rd STREET, CLEVELAND, OHIO, U.S.A.

BENDER

NO DIES!

SHEAR



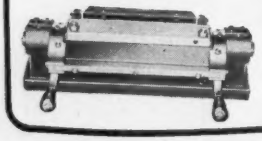
"DIE-LESS" DUPLICATING

"DIE-LESS" DUPLICATING

might be described as a new industrial technique made possible by the accuracy, extreme adaptability and ease of operation of DI-ACRO Precision Machines—Shears, Brakes, Benders—when used as a continuous, integrated production process.

The DI-ACRO System of METAL DUPLICATING WITHOUT DIES has proven its adaptability in making parts just as accurately as can be done with dies, to a tolerance of .001" in all duplicated work. The delay of waiting for dies is avoided, deliveries speeded up.

BRAKE



DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

Write for Catalog

O'NEIL-IRWIN MFG. CO.

303 EIGHTH AVE. SO. • MINNEAPOLIS 15, MINN.

Development of Electrical Heating for the Wire Industry

(Continued from Page 193)

the new starting coil and adjustable electrode a cold furnace can be brought to operating temperature in minutes instead of hours and the adjustable electrode makes possible maximum input from the start to final temperature so that starting time is one third otherwise possible.

✦ ✦ ✦

THE portable starting coil heating like the familiar household bread toaster (though thicker and stronger and for greater power at low voltage) delivers full rating amperage directly to the bath material as soon as the current is thrown on. The coil is removable (for working space) and is reimmersed when furnace is shut down.

✦ ✦ ✦

BY adjusting the electrode the maximum convection stirring and exact regulation of input to any degree are provided.

✦ ✦ ✦

THE annealing installation pictured illustrates the fast heating characteristic of this equipment. Complete data on operating is shown in the accompanying table from an actual shop report.

✦ ✦ ✦

Forty-five Thousand Alien Patents and Patent Applications Thrown Open to New England Manufacturers

FORTY-FIVE thousand alien patents and patent applications, covering nearly every field of manufacture, were made available to New England manufacturers through a Patent Library established in Boston by the Office of Alien Property Custodian on February 1, 1944.

✦ ✦ ✦

PLANS of the Division of Patent Administration, Office of Alien Property Custodian, to open a library at 17 Court Street, Boston, where manufacturers will be assisted to obtain rights under

licenses to use the vested enemy patents and the patents of enemy occupied nations, were disclosed recently with the announcement of the appointment of **Julian E. Jackson,** formerly professor of business law at Northeastern University and more recently an official of the OPA, as New England Representative of this division.

✦ ✦ ✦

IN this library manufacturers will find the secrets of German, Japanese and Italian methods once protected for alien profit by the patent laws, thrown open to them. Industrialists will learn how the experts of Germany and Japan have made some of the synthetic products that have competed with American-made wares in our markets.

✦ ✦ ✦

THE Custodian's office controls today the largest block of patents in the United States. A catalog of about forty-five thousand of these patents has been prepared for sale and will be available for examination along with copies of the patents themselves in the new library. The establishment of the library should be a boon to Small Business of New England, particularly those manufacturers whose operations do not warrant the employment of engineers for lengthy research projects. The immediate effect of the licensing of these patents will be to assist these plants in war manufacturing but the larger effect will be to benefit post-war plans of smaller industries. Mr. Jackson, as Representative of the Division of Patent Administration, will work very closely with the Smaller War Plants Corporation which has appointed **Malcolm S. Jones,** an experienced mechanical engineer, as Technical Advisory Consultant, who will be available to assist anyone seeking new processes or methods of manufacture. The New England Industrial Research Foundation is also actively interested in making these patents available to New England industries.

(Please turn to Page 196)

APEX "SFV" PERFORMANCE DATA

(Case #12)

Type of Wire: **Hot-Dip Galvanized Signal Corps**
Concentration: **6% by weight with H_2O**
Reduction: **70%. From .024 to .013**
No. of Holes: **7**
Drawn: **Wet**
Results: **Upon examination finish was found to be both smoother and brighter than former practice had produced. Galvanize "peeling" in front of each die was eliminated entirely.**

Foreman's report verbatim: "This 'SFV' has just produced one of the longest and smoothest coils of fine wire to come out of this Mill."

Conclusion: **APEX "SFV" WIRE DRAWING COMPOUND can do for you, in your Mill, just what it has done in the above case, for this country's largest producer of signal corps wire.**

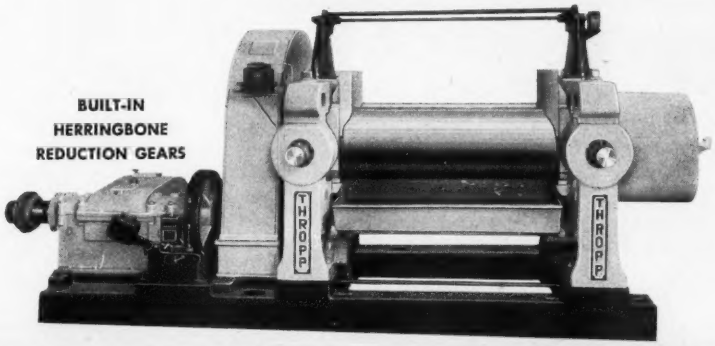
A trial will convince you.

APEX ALKALI PRODUCTS COMPANY
MAIN AND RECTOR STREETS
PHILADELPHIA 27 PENNSYLVANIA

New! HEAVY DUTY MILLS
Size 20 & 22 x 60 Inch

for·· Compounding and Warming of Synthetic Rubber and Tough Resins. Custom built to your requirements.

Write for Complete Information



WM. R. THROPP & SONS CO. TRENTON *New Jersey*
WASHERS CRACKERS REFINERS CALENDERS

FOR SALE

We have the following list of motors and equipment for sale, all in good operating condition:

GENERAL ELECTRIC MOTORS

35 HP Induction Motor—Type 1—8—35A —900—Form L—Serial No. 295148 3 Ph.—60 Cy.—550 Volt—36 Amp.—870 RPM.

7½ HP Induction Motor—Type KT6—7½ 1200—Form C—Serial No. 274760 3 Ph. 60 Cy.—550 Volts—7.6 Amp.—1200 RPM.

25 HP Bissell Induction Motor—Serial No. Z-17255—2 Ph.—60 Cy. 440 Volts—32 Amp.—900 RPM. This motor has new winding.

1 HP Howell Red Band Induction Motor —Type SC—Frame 0006—3 Ph.—60 Cy., 550 Volts—1.3 Amp. Serial No. 29181—1800 RPM.

25 HP Lincoln Induction Motor—Serial No. 50849—List No. 12228—Frame C-14 —3 Ph.—60 Cy. 440 Volts—32 Amp.—35° Temp. rise 900 RPM—Rails and gear.

1—150 HP Westinghouse Motor—500 RPM —60 Cycle—3 Phase—440 Volts—Serial No. 4595978—Style 7.23655—Frame 954A.

½ HP Induction Motor—Frame 1455—Form D Type RKT—Model No. 25321 3 Ph.—60 Cy.—440 Volts—.83 Amp.—1725 RPM.

½ HP Induction Motor—Type RKT—Frame 1455—Form D—Serial No. M.G. Model No. 28321—3 Ph. 60 Cy. 440 Volts—.83 Amp.—1725 RPM.

40 HP Ideal Induction Motor—Type A—Frame A306-22—Serial No. 15287 3 Ph. 60 Cy.—440 Volts—52 Amp.—690 RPM —Base.

30 HP Bissell Induction Motor—Serial No. Z 26498—3 Ph.—60 Cy., 440 Volts —38 Amp., 900 RPM—Rails.

1 HP Brown and Brookmer Induction Motor—3 Ph.—60 Cy.—440 Volts 1.5 Amp.—1800 RPM.

3—Bellis Transformers: 440 Volts to 17, 19, 22, 24, 60 Cycles, Secondary Amp. 5218 Air Cooled. Single Phase.

1—Jones-Herringbone Speed Reducer —Serial 125117—Cat. Rat. 155 HP—Service Rat. 155 HP—Ratio 12.454—Service Factor 1—Class 1—Size 330 DH.

Please write for information on items of interest to you.

THE SENECA WIRE & MFG. CO.

FOSTORIA, OHIO

ACID AND ALKALI PROOF LININGS AND MORTARS

●

ACID PROOF CONSTRUCTION

●

THE CEILCOTE CO.

Consulting and Research Engineers

750 ROCKEFELLER BLDG.
CLEVELAND, OHIO

Forty-five Thousand Alien Patents and Patent Applications Thrown Open to New England Manufacturers

(Continued from Page 195)

A FULL-TIME librarian will be in attendance in the Patent Library, which will be equipped with a Patent Office Classification Manual, Catalog of Vested Patents, cross-reference material, and abstracts of patents in certain important fields of manufacture. Visitors to the library will be assisted in locating patents of the type in which they are interested and in applying for licenses under them. Manufacturers contemplating the selection of suitable patents are urged to send an experienced engineer to this library to search its files and to consult with the staff.

✦ ✦ ✦

THE plan for licenses is simple and attractive. Any vested enemy patent, which had not been exclusively licensed to an American firm or individual prior to seizure by the Custodian, can now be licensed to reputable American firms or individuals for the life of the patent without royalties and on a non-exclusive basis. The only cost is a $15.00 fee for each patent licensed.

✦ ✦ ✦

A BRIEF survey of the catalog of vested patents brings to light listings of several hundred inventions in the field of machine tool manufacture, hundreds more in the field of chemical products, and a large number in the field of electrical equipment. Other interesting fields covered are tanning and leather manufactures, mining and minerals, textile machinery and processes, wood utilization and aeronautics. In connection with the last item, it is interesting to know that there are a large number of patents dealing with helicopters and other new types of flying machines.

BED SPRING MECHANIC

WANTED—Experienced high-grade mechanic, tool maker, designer; to take complete charge of bed spring and innerspring department's equipment. Must be thoroughly familiar with all Wells machinery and spring making practices.

BOX MB4323

"BEDDING" 666 LAKE SHORE DR. CHICAGO, ILL.

MORE than two thousand patent licenses have so far been issued to American manufacturers by the Custodian. Among the patents licensed to New England concerns recently are those covering stocking knitting machinery, textile winding and yarn guiding machinery, synthetic fibre from casein, and moth proofing material.

✦ ✦ ✦

NEW England manufacturers should take full advantage of the services rendered by this Patent Library, first by writing to Mr. Jackson for a gratis copy of "PATENTS AT WORK" which explains the program in detail and contains a list of the patent office classifications and the number of vested patents in each class, following this with a personal visit to the library located at 17 Court Street, Boston 8, Massachusetts.

✦ ✦ ✦

Grinding Wheels of 57 Alundum Available

NORTON Company of Worcester, Massachusetts, announces that grinding wheels made of their 57 Alundum abrasive are now available for general use. 57 Alundum abrasive is an improved aluminum oxide product which was developed by the Norton research laboratories several years ago and which proved an immediate success in wheels for cylindrical grinding, centerless grinding, internal grinding and snagging (slow speed).

✦ ✦ ✦

PRODUCTION facilities at the time of introduction were limited, however, so that it was necessary to confine the use of 57 Alundum grinding wheels to those critical war jobs where their special characteristics were most beneficial. Production capacity has now been increased so that 57 Alundum grinding wheels are available for all uses.

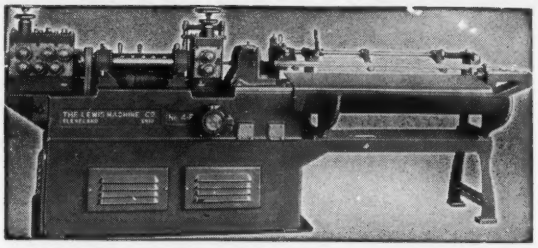
✦ ✦ ✦

THIS 57 Alundum abrasive is more friable than regular Alundum abrasive. This means that wheels of 57 Alundum have a fast, cool cutting action as they tend to keep themselves sharp but they also have the ability to hold shape and require few dressings. They have been especially successful in crankshaft grinding where the ability of the wheel corner to stand up is very important.

✦ ✦ ✦

THESE 57 Alundum grinding wheels are available in the patented Norton BE vitrified bond as well as in regular vitrified bond in a wide range of grain sizes, grades and structures.

LEWIS TRAVEL-CUT WIRE STRAIGHTENING and CUTTING Machines



Machines for 1/16" to 3/4" rod

Round
Square
Flat
Hexagon
Ferrous and Non-Ferrous

Automatic
High Speed
Heavy Duty

The Sign of Dependable Service:

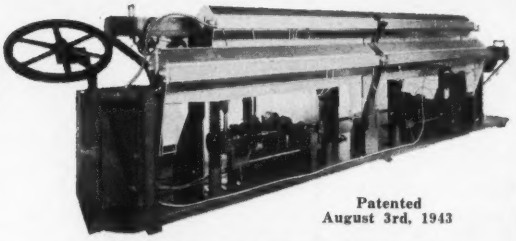
WE CAN SUPPLY AND ENGINEER OUR TOOLS EQUIPPED WITH CARBOLOY CEMENTED CARBIDE

THE LEWIS MACHINE CO., 3445 E. 76 St., Cleveland, Ohio

WIRE MACHINES FOR

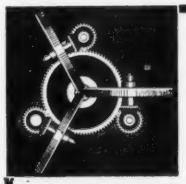
Drawing, Enameling, Tinning, Spooling, Insulating with Glass, Asbestos, Paper Tape, Cotton, etc. Multiple Pull-outs, Rubber covered wire Panners, etc.

EST. 1865 AIMCo INC. 1919
"American" INSULATING MACHINERY COMPANY
517 West Huntingdon St.
PHILADELPHIA PENNSYLVANIA U.S.A.



Patented August 3rd, 1943

ELECTRIC BAKING OVEN
for Varnished Glass Insulated Wire
with Varnish Applicators
and Thermostatic Control.



WIRE MEASURING MACHINE
FOR LINEAR MEASURE
PROVIDES NEW STANDARD OF ACCURACY

Illustration Shows Exclusive Patented "3V" Principle

Measuring twisted, armored, bare or insulated wire without vibration or inaccuracies at any speed or varying speeds!

Write for Information and Prices

LYON-VAIL MACHINE CO.. INC.
97 Belmont Street, BROCKTON, Massachusetts

LYONBILT

Issues Anniversary Booklet

THE Hauser-Stander Tank Co., 4838 Spring Grove Ave., Cincinnati, Ohio, in commemoration of their Seventy-Fifth Anniversary in 1944, have issued a beautiful brochure, in which the history and development of the Company is recorded, and a number of photographs illustrate the large and varied types of applications to which their tanks may be put in industry. Persons desirous of having a copy can secure it by addressing the Company direct.

How To Obtain A Heavier Lime Coat!

Wire manufacturers, faced with the problem of obtaining a heavier, more even lime coating on rods after pickling, find that a specially designed Oakite technique provides the RIGHT answer.

Rods are thoroughly prepared for liming by immersing coils in a recommended boiling solution of Oakite Composition No. 24 for short period. Treatment also helps prevent rust-scale when work is stored or shipped before drawing...assures proper neutralization of rods. Data FREE. Write TODAY!

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52A THAMES ST., NEW YORK 6, N. Y.

Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE
MATERIALS...METHODS...SERVICE
Buy Bonds for Victory

FOR FINE WIRE NO FINER LUBRICANT

•

Compounded especially for high-speed machines.

Completely soluble—No fillers—Hence no clogging up of spray jets.

Extremely stable: Uniform, die-saving, trouble-free lubricity at all times.

Economical in use—Efficient in operation.

Apex "SFV" Wire Drawing Compound

(See Page 195 for further information.)

•

Address inquiries to:

APEX ALKALI PRODUCTS COMPANY

Main & Rector Sts., Phila. 27, Pa.

Underwater Telephone Line

UNWILLING to wait for the arrival of regular submarine telephone wire during the desperate fighting for Munda in July of last year, a Signal Corps detachment laid an underwater telephone line from Corps headquarters on Rendova Island to two divisions on the mainland with Spiral 4 cable. This cable is made to be used on land. This marked the first time its use for underwater communications has been reported.

✦ ✦ ✦

SPIRAL 4 cable ordinarily is used by Signal men to establish semi-permanent wire channels to the front lines. It is utilized with carrier equipment and furnishes a number of voice and telegraph circuits to division and regimental command posts. It was used with great success in the North African and Sicilian campaigns and is playing its part in furnishing vital communications to the troops now fighting in Italy.

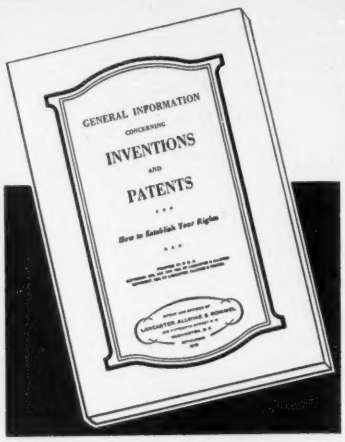
✦ ✦ ✦

Male and female sockets together. Rendova 1943.

THE story of its utilization as submarine wire was brought back to this country by **Col. Francis L. Ankenbrandt**, Signal Officer of U. S. Army forces in the South Pacific Theater of Operations. Col. Ankenbrandt described the operations as follows:

✦ ✦ ✦

"THE job of getting wire communications to the two divisions on Munda was one of the outstanding feats I witnessed during the year and a half I have been in that theater. The nine-mile route was half jungle and half ocean. Part of the time, the working



Send for a copy - it's free.

Interesting Booklet concerning Inventions, Patents, Trade-Marks and Copyrights, together with Schedule of Government and Attorney's fees, sent free on request. Simply ask for "booklet and fee schedule."

No charges are made for preliminary advice, either in connection with patent, trade-mark or copyright cases.

Lancaster, Allwine & Rommel
Registered Patent & Trade-Mark Attorneys
438 Bowen Bldg., Washington, D. C.

If you MAKE or USE WIRE YOU NEED ONE OF THE MANY

Porter Cutters

Indispensable in wire mills for sampling large wire.

In almost universal use by wire fabricators for cutting reinforcing fabric, fencing, spring wire, etc.

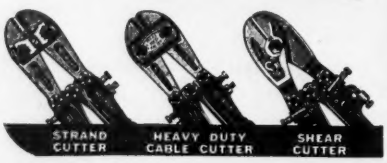
Useful in any plant—large or small—for all sorts of maintenance and repair work—for cutting bolts, rods, wires, rivets, wire rope, chains, or for splitting deformed or "frozen" nuts.

There is a standard Porter tool for every cutting job up to ¾" annealed bolts or ½" hardened chains. Special cutters designed to fit your industry's needs.

Send for Catalog of PORTER CUTTERS.

SEND FOR CATALOG

H. K. PORTER, INC.
EVERETT, MASS.



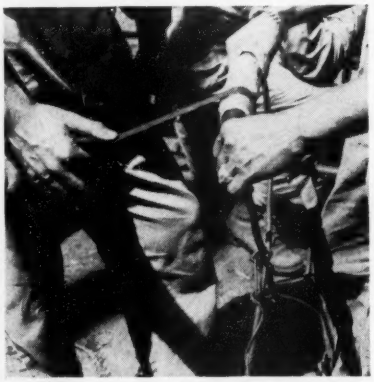
party, led by **Major George A. Reeves**, of Oklahoma City, Oklahoma, was under heavy fire from Jap artillery emplaced in the hills, strafing attacks by Jap aircraft, and snipers along the shore of the mainland.

✦ ✦ ✦

"WHEN we learned that Corps wanted that line through, we organized a construction section of 50 men from an operations company and a construction battalion. The route ran through 1¼ miles of muddy plantation; 2.2 miles of ocean, with a depth of 1,700 feet; 2.4 miles of almost impassable jungle; another 2.2 miles of ocean and 1 mile through tangled jungle on the mainland.

✦ ✦ ✦

"THE ocean laying part of the job was the most interesting from a technical angle. Much care was given the sealing of connectors to assure maximum waterproofing. Rubber tape and friction tape was used, since it was the only material available. The cable was looped at each of the connectors to relieve the strain, and the cable was laid in a landing boat in figure 8 loops.



Friction tape is put over rubber tape. ✦

✦ ✦ ✦

"PAYING out the cable over the first water route was completed in one hour and forty-five minutes. Nothing unusual was encountered except that extreme care had to be taken so as not to bruise the cable or shear the connections on the coral. The cable was paid

(Please turn to Page 200)

NIAGARA Aero HEAT EXCHANGER

Saves cooling water cost, saves equipment, saves power. Controls temperature of Wire Drawing Compounds, Industrial Liquids, Quenching Baths, Jacket Water, Lubricating Oils.

Write for Bulletins 90 & 94

NIAGARA BLOWER COMPANY

General Sales Office: 6 E. 45th St., New York 17, N. Y.
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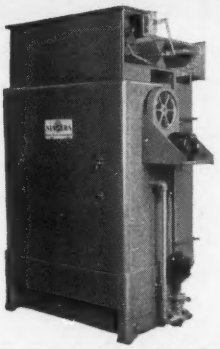
SALES ENGINEERS IN PRINCIPAL CITIES



U. S. Patent Nos. 2,296,946 and 2,321,933

SOMETHING NEW — — — — — — — — — — GET THE FACTS!

A PAY-OFF STAND

WITH PREDETERMINED AND CONSTANT TENSION

(Patent Applied For)

For Low or High Speeds.
Accommodates Different Size Reels.
Select Desired Tension (In Pounds).
Tension Remains Constant Throughout the Unwinding of the Reel.
No Overrunning of the Reel. No Springs.
Pay-Off Stand Also Includes a Lift for Heavy Reels.
Especially Adapted for Paying Off Wire to CV Machines.

Address inquiries to:

COOK ENGINEERING CO.

265 NORTH NINTH STREET (Tel. SHerwood 2-9445) PROSPECT PARK, N. J.

ROOS

WIRE DRAWING DIE MACHINERY

Has proven itself by the performance of precision and quality work in almost every steel, aluminum and copper mill in the U. S. A.

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DRILLERS and GRINDERS

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FOR THE WIRE INDUSTRY

BUNCHING
BRAIDING
MEASURING
TWISTING

NEBUTT'D

CLOSING
CABLING
STRANDING
COILING

Also special machines designed or built to order. Let us know your requirements.

NEW ENGLAND BUTT COMPANY

PROVIDENCE 7, R. I.

European Agency: James Day (Machinery) Ltd., Ford House, 88 Regent St., London, W.-1, England

STEELSKIN

REG. U. S. PAT OFFICE

For High or Low Carbon Wire

WIRE, TUBING, STAMPING, DEEP DRAWING SOAPS and COMPOUNDS

Established 32 years

R. H. MILLER CO., Inc. Homer, N. Y.

Manufacturers of

MUSIC WIRE--ALL SIZES

Stainless Steel — High Carbon — Silver Nickel

Aircraft Cable & Field Telephone Wire

Wire Straightened and cut to length

All types of wire redrawn to specifications

JERSEY STEEL & WIRE CORP.

84 COIT STREET - - - IRVINGTON, N. J.

Tel. Essex 2-0800

APCO-MOSSBERG STEEL REELS & SPOOLS

Standard Equipment in War as in Peace

Apco Mossberg Steel Reels are standard throughout the wire industry – and for good reason! Apco Mossberg – the original Frank Mossberg Co. – *originated* the steel reel idea and have been training workmen in their manufacture ever since. That is why Apco Mossberg Steel Reels are preferred where the pressure of wartime production schedules is heaviest.

FREE ENGINEERING SERVICE

We will gladly submit drawings, blueprints, or suggestions without obligation to you. Write for quotation today.

APCO MOSSBERG CO.

(The Original Frank Mossberg Co.)

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For the Finest DIAMOND WIRE DRAWING DIES

***Look for the mark* W.W.D. CO.**

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Underwater Telephone Line

(Continued from Page 199)

out generously and reached a floating level at an estimated depth of between 25 and 50 feet. Barbed wire stakes were used as anchors and were placed at every one-eighth mile.

✦ ✦ ✦

"FIELD wire was used to link the two submarine circuits at Roviana Island, in the middle of the channel of water. Wire had to be carried from boats to shore over sharp coral from 50 to 100 feet and further. The men wore out new shoes in a single day doing this. At about the center of the island, the boats were so far from shore they were fired on by Jap snipers located on the mainland.

✦ ✦ ✦

"OUT of the four circuits obtained, three were still in operation when I left in November. One circuit had gone out about 30 days after the installation."

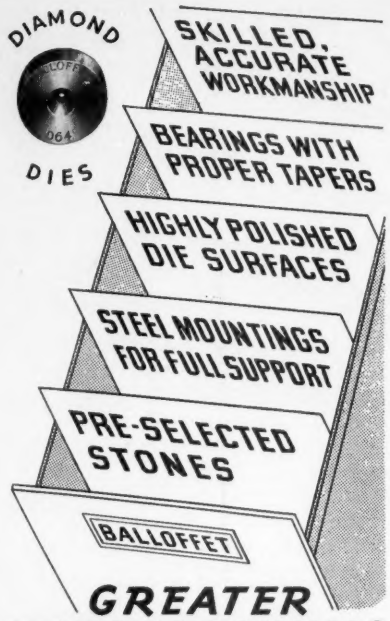
✦ ✦ ✦

Closeup of cable being brought together and loaded on Higgins boat. Rendova 1943. ✦

COMMUNICATION on all the islands in the South Pacific Area, which is under the command of Admiral William F. Halsey, is by wire, Col. Ankenbrandt pointed out. Interisland communication is by radio. Both perform very well.

✦ ✦ ✦

ON the islands, telephone systems have been installed by the Signal Corps. Commercial switchboards that vary in size from 1 to 10 positions are used. This follows the general practice of substituting commercial equipment for



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tactical equipment after combat operations are over in each area.

✦ ✦ ✦

VARIOUS fixed radio transmitters and receivers link New Caledonia, theater headquarters, with the various island commands —Guadalcanal, Samoa, Bora-Bora, Bougainville, etc. There is also a radio circuit to Australia.

✦ ✦ ✦

Places Offices Under One Roof

THE North American Philips Company, Inc., recently consolidated their several American manufacturing interests into one corporation, and have opened new offices at 100 East 42nd St., New York 17, N. Y.

✦ ✦ ✦

ON the occasion of dedicating the opening of these new offices, the Company gave a housewarming party for the press, at which their executives, engineers and research, technical and commercial men acted as hosts to the members of the technical press attending.

✦ ✦ ✦

AT this meeting their showroom was formally opened, and **Mr. Pieter van den Berg,** Vice President and General Manager, in addressing the gathering, announced their establishment of a new electronic research laboratory in Irvington, N. J., with **Dr. O. S. Duffendach** as its Director.

✦ ✦ ✦

THE North American Philips Company manufactures electronic tubes, x-ray equipment for industrial and professional purposes, and a variety of wire specialties, such as precious metal, tungsten, magnesium, aluminum, molybdenum and other wires.

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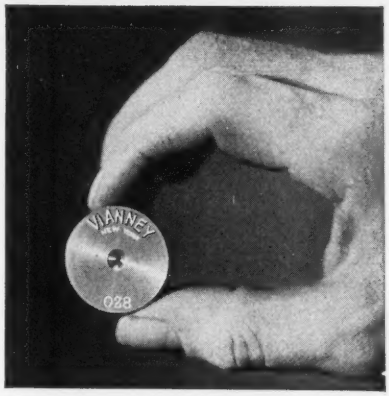

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New Small Extruder for Welding Rods Announced

DESIGNED to aid laboratory and experimental work in a wide range of extrusion processes, an unusual combination machine is announced by the Moslo Machinery Company, of Cleveland. The new design combines a laboratory type 12-ton hydraulic extrusion press and an automatic wire feed unit in one machine occupying only two by four feet of floor space.

✦ ✦ ✦

SIMPLICITY of operation, convenience of control and neat, modern lines characterize this press. It is of welded steel construction throughout. While designed primarily for the extrusion of welding rods, the press may be had with dies for extruding powdered metals, carbon and certain plastics. The combination unit is so designed that the press can be sold without the wire feeding unit.

✦ ✦ ✦

ACCORDING to **Ernest P. Moslo,** designer, his new machine offers a wide range of speeds on the oil cylinder. Pressure of 10,000 pounds per square inch on the material is achieved, which, combined with the automatic wire feeding, makes the machine suitable for small scale production of welding electrodes. A separate cylinder is used for slugging, so

ZINC STRIP AND WIRE

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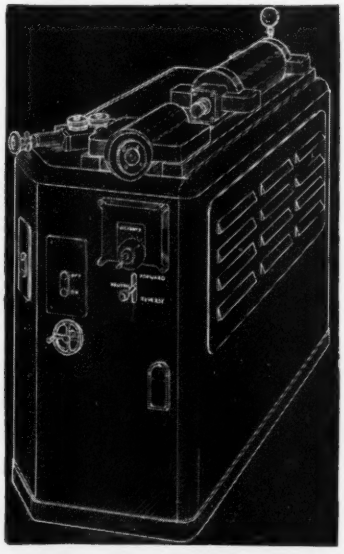
✦ ✦ ✦

THE compact combination unit is so built that it ships complete, including an extrusion die head, ready to set on a laboratory or factory floor, connect to a power line and go into action. Hydraulic and electrical controls are located in a panel at the operating end, with a pressure gauge, reading in



direct pressure on the extrusion cylinder, always in view of the operator. The manufacturer states that this machine is now in production, and twelve week deliveries can be made on proper priorities.

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Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, O.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.
Wopis Industry Laboratory, Brooklyn, N. Y.

DIRECT ELECTRIC RESISTANCE HEATING—
Trauwood Engr. Company, Cleveland, Ohio

DRAW BENCHES—
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.
Standard Machinery Co., Providence, R. I.
Vaughn Machinery Co., Cuyahoga Falls, O.

DRUMS—Flange Steel
Stevens Metal Products Co., Niles, O.

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

DRYING AND PRE-HEATING ROOMS—
Industrial Oven Engr. Co., Cleveland, O.

DRYING EQUIPMENT—
Niagara Blower Co., Buffalo, N. Y.
Ross, J. O., Engr. Corp., New York, N. Y.

ENGINEERS—Consulting Wire Mill
Hartley, George D., Worcester, Mass.
Lewis, Kenneth B., Worcester, Mass.

EQUIPMENT—Humidifying
Niagara Blower Co., Buffalo, N. Y.

EQUIPMENT—Industrial Cooling
Niagara Blower Co., Buffalo, N. Y.

EQUIPMENT—Insulation Testing
Davis, R. L., Electric Co., Wallingford, Conn.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FLASH BAKER—
Morrison Engr. Corp., Cleveland, Ohio

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin, Wm. M., Co., Pittsburgh, Pa.

FRICTION PAY-OFF STANDS—
Industrial Oven Engr. Co., Cleveland, O.

FURNACES—Annealing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Morrison Engr. Corp., Cleveland, Ohio
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Trauwood Engr. Company, Cleveland, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

WHERE TO BUY, Continued

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Morrison Engr. Corp., Cleveland, Ohio
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Brazing
Electric Furnace Co., Salem, O.
Firth-Sterling Steel Co., McKeesport, Pa.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, O.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Electric
Electric Furnace Co., Salem, Ohio
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Trauwood Engr. Co., Cleveland, Ohio

FURNACES—Hardening & Tempering
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Trauwood Engr. Co., Cleveland, Ohio

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio
Robertson, John, Co., Brooklyn, N. Y.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

FURNACES—Non-Oxidizing
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

FURNACES—Normalizing
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

FURNACES—Salt Bath
Electric Furnace Co., Salem, Ohio
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio

GALVANIZING EQUIPMENT—
Wilson, Lee, Engr. Co., Cleveland, Ohio

GALVANIZING KETTLES—
National Annealing Box Co., Washington, Penna.

GRINDERS—Roll
Norton Co., Worcester, Mass.

HI-SPEED BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

INHIBITORS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Parkin, Wm. M., Co., Pittsburgh, Pa.

INSULATION LACQUERING SYSTEMS—Continuous
Industrial Oven Engr. Co., Cleveland, O.

KETTLES—Galvanizing, Annealing, Tinning, etc.
National Annealing Box Co., Washington, Penna.

LATHES—Die Reaming
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Morgan Construction Co., Worcester, Mass.
Roos, H. & G., Tool & Mfg. Co., Montclair, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry & Machine Co., Waterbury, Conn.

LININGS—Acid and Alkali Proof
Ceilcote Co., The, Cleveland, Ohio

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

LUBRICANTS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robertson, John, Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Fidelity Machine Co., Philadelphia, Pa.
Mosaberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Syncro Machine Co., Rahway, N. J.

MACHINERY—Bunching
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Coilers
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
American Insulating Machy. Co., Philadelphia, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
American Insulating Machy. Co., Philadelphia, Pa.
Fidelity Machine Co., Philadelphia, Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, Ohio
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery Inc., Cleveland, Ohio.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Porter, H. K., Inc., Everett, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Die Making
Firth-Sterling Steel Co., McKeesport, Pa.
Roos, H. & G., Tool & Mfg. Co., Montclair, N. J.

MACHINERY — Die Making for Forming Special Shapes
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Draw Benches
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging
Broden Construction Co., Cleveland, Ohio.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Enameling
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Extruding
Robertson, John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.
Thropp, Wm. R., & Sons Co., Trenton, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Galvanizing
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Fidelity Machine Co., Philadelphia, Pa.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Lead Encasing Presses, etc.
Robertson, John, Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John, Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Material Handling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

WHERE TO BUY, Continued

MACHINERY — Measuring Wire & Cable
Davis, R. L., Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Brockton, Mass.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Broden Construction Co., Cleveland, Ohio.
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Pointing
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Quill Winding
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Rubber for Insulating Wire
Royle, John, & Sons, Paterson, N. J.

MACHINERY—Rubber Strip Covering
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Working, Mills, Calendars, etc.
Thropp, Wm. R., & Sons Co., Trenton, N. J.

MACHINERY—Screw Wire
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Emory, Robert J., Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I. (Special Designs)
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Emory, Robert J., Co., Newark, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, Ohio
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery Co., Cleveland, Ohio
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Swaging
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing
Scott, Henry L., Co., Providence, R. I.

MACHINERY—Testing Size of Wire
Davis, R. L., Electric Co., Wallingford, Conn.

MACHINERY—Testing Spring
Standard Machinery Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Welding Wire
Micro Products Co., Chicago, Ill.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wind-up (Constant Tension, Variable Speed)
Industrial Oven Engr. Co., Cleveland, O.

MACHINERY—Wire Bending
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Wire Measuring
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Inc., Brockton, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Wood Screw
National Machinery Exchange (Used), New York, N. Y.

MATERIAL HANDLING EQUIPMENT
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem Rolling and Edging
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.

OILS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Shell Oil Co., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

OVENS—Cable Lacquering
Industrial Oven Engr. Co., Cleveland, Ohio

OVENS—Dehydrogenizing
Industrial Oven Engr. Co., Cleveland, O.

OVENS—Industrial
Carl-Mayer Corp., The, Cleveland, Ohio
Industrial Oven Engr. Co., Cleveland, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

OVENS—Welding Rod Coating
Industrial Oven Engr. Co., Cleveland, O.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAINTS—Marine
American Chemical Paint Co., Ambler, Pa.

PAINTS—Structural Steel
American Chemical Paint Co., Ambler, Pa.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Penna.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Crepe-Kraft Co., Newark, N. J.

PAPER TESTERS—
Scott, Henry L., Co., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PAY-OFF STAND—Constant Tension
Cook Engineering Co., Prospect Park, N. J.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Parkin, Wm. M., Co., Pittsburgh, Pa.

PICKLING TANK LININGS—
Keagler Brick Co., Steubenville, Ohio.
Sauereisen Cement Co., Pittsburgh, Pa.

PIPES AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

PLASTIC TESTERS—
Scott, Henry L., Co., Providence, R. I.

POTS—Lacquer
Industrial Oven Engr. Co., Cleveland, O.

POTS—Lead Melting
Robertson, John, Co., Brooklyn, N. Y.

POWDER—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.

PRESSES—Hydraulic and Mechanical
Robertson, John, Co., Brooklyn, N. Y.
Standard Machinery Co., Providence, R. I. (Mechanical Only)

WHERE TO BUY, Continued

PRESSES—Lead
Robertson, John, Co., Brooklyn, N. Y.

PRESSURE VESSELS—
National Annealing Box Co., Washington, Penna.

PULLERS—Wire
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

QUENCHING BATH CONTROLS—
Niagara Blower Co., Buffalo, N. Y.

REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Moslo Machinery Co., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS—Annealing and Stranding
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS AND SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Takeoff
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Vulcanizing and Impregnating
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Moslo Machinery Co., Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

RODS—Wire—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Wickwire Spencer Steel Co., New York, N. Y.

ROLL STRAIGHTENERS—
Moslo Machinery Co., Cleveland, Ohio

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Brewer Mfg. Co., Muncy, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott, Henry L., Co., Providence, R. I.

RUST PROOF COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

RUST REMOVING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

SATURATION SYSTEMS—
Industrial Oven Engr. Co., Cleveland, O.

SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

SHEET—Steel
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

SOAPS—Industrial and Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

SOLVENT RESIN SYSTEMS—Experimental
Industrial Oven Engr. Co., Cleveland, O.

SPOOLS—Annealing and Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

STAMPINGS—Steel
Hubbard Spool Co., Chicago, Ill
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRAND—Steel and Copper
Brewer Mfg. Co., Muncy, Pa.

STRIP—Brass and Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

STRIP METAL TESTERS—
Scott, Henry L., Co., Providence, R. I.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TANK LININGS—Brick
Keagler Brick Co., Steubenville, Ohio.
Nukem Products Corp., Buffalo, N. Y.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Pickling
Haveg Corp., Newark, Del.
Nukem Products Corp., Buffalo, N. Y.
Sauereisen Cements Co., Pittsburgh, Pa.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.

TEMPERATURE CONTROLS—
Niagara Blower Co., Buffalo, N. Y.

TENSILE TESTERS—
Scott, Henry L., Co., Providence, R. I.

TESTING INSTRUMENTS—
Scott, Henry L., Co., Providence, R. I.

TOOLS—Wire Cutting
Porter, H. K., Inc., Everett, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS—
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS—
Ruesch, H. J., Machine Co., Newark, N. J.

TURKS HEADS—Friction and Power Driven
Standard Machinery Co., Providence, R. I.

VALVES AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Micro Products Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio

WIND-UP AND UNWIND SYSTEMS—Continuous
Industrial Oven Engr. Co., Cleveland, O.

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Electric
Callite Tungsten Corp., Union, City, N. J.
Hudson Wire Co., Ossining, N. Y.

WIRE—Enameled for Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Wickwire Spencer Steel Co., New York, N. Y.

WIRE—Music
Callite Tungsten Corp., Union City, N. J.
Jersey Steel & Wire Corp., Irvington, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.

WIRE—Non-Ferrous to Specification for Special Purposes
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Stainless Steel
Callite Tungsten Corp., Union City, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Wickwire Spencer Steel Co., New York, N. Y.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Wickwire Spencer Steel Co., New York, N. Y.

WIRE AND STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE TESTERS—
Scott, Henry L., Co., Providence, R. I.

WIRE, WEAVING—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

WRAPPING PAPER—Creped
Crepe-Kraft Co., Newark, N. J.

YARN TESTERS—
Scott, Henry L., Co., Providence, R. I.

HUDSON WIRE COMPANY

PRODUCERS OF FINE WIRES IN ALL METALS

FINE BARE WIRES

High Brass, Low Brass, Zinc 99.99+ and High Tensile Zinc, Commercial Bronze, Phosphor Bronze, Pure Tin, Lead, Antimonial Lead, Tinsel Lahns, Silver Plated Copper, False Gold and Copper.

Cadmium, Nickel Silver, 10%, 18% and 30%; Silver Plated Copper, False Gold and Special Brass and Bronze Alloys to Specification, Metallic Fibre for Packing Purposes, Copper, Bronze, Zinc, Lead and Aluminum.

WIRES FOR METAL SPRAYING

Pure Lead, Lead Alloy, Pure Zinc, Zinc Alloy, Copper, Tin, High Brass, Low Brass, Solder Wire, High Conductivity, Electric Wire.

Cadmium, Nickle Silver, (10%, 18%, 30%); Aluminum, Monel Metal, Phosphor Bronze, Pure Nickel, Commercial Bronze.

Look for the name — **HUDCO** — A guarantee of quality

"HUDCO" specially processed Copper Wire for enamelling purposes is drawn from Selected Copper, insuring the maximum conductivity. This is but one example of the use of the most advanced and approved materials and methods in our processing.

BETTER WIRE AT LOWER COST

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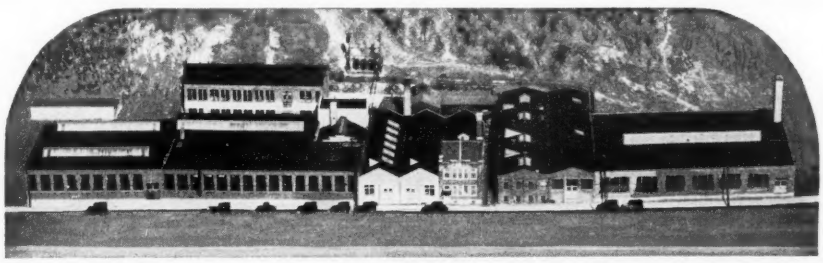

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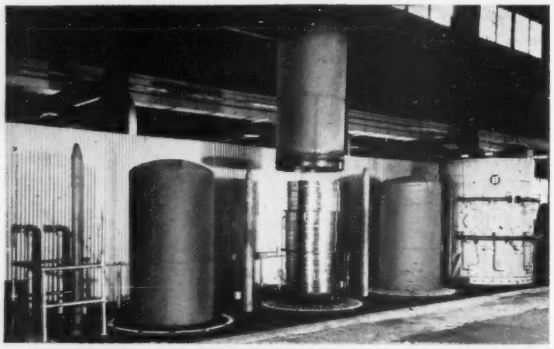
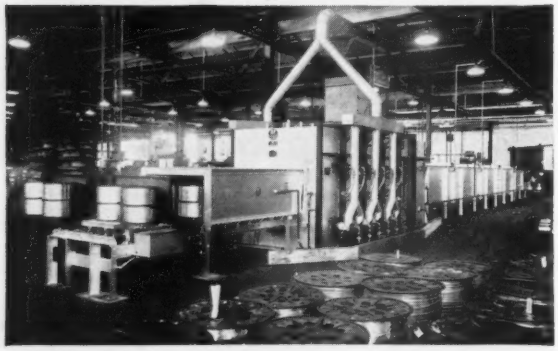
For Every Industrial Heat Treating Process



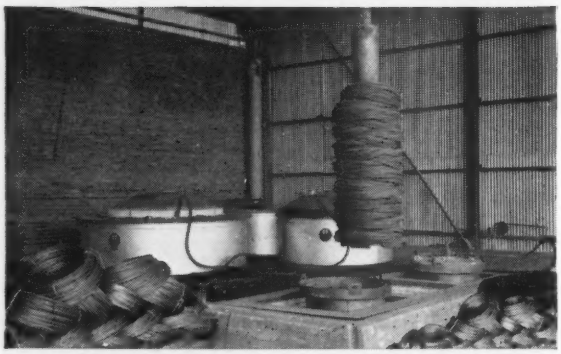
Bright Annealing Strip, Wire, etc.

These **EF** bell type furnaces maintain uniform temperature distribution throughout the material regardless of the size, weight or height of the charge. They are equipped with motor driven fans, protective atmosphere generators, special radiant type gas burners and other **EF** features. This installation is bright annealing mirror-finish cold rolled strip.



Bright Annealing Copper Wire

This **EF** combination gas-electric furnace bright anneals 2500 lbs. of copper wire per hour—uniformly and continuously. The furnace handles rod in coils as well as fine wire on spools or reels. The combination gas-electric feature combines the advantage of electric heating with the economy of gas heat. Investigate this feature. We build them in various sizes and types.



Normalizing and Annealing Rod

These **EF** circular pit type furnaces are used for bright annealing wire as well as for normalizing and spheroidizing rod. Very efficient furnaces with excellent temperature distribution. These furnaces are designed for firing with coke oven gas, mixed gases, natural gas, or fuel oil and may be furnished in single units or in batteries as required.

Clean Hardening Bolts, Springs, etc.

These two **EF** gas fired continuous chain belt conveyor furnaces are scale-free hardening bolts. Springs, gears, bearing parts and miscellaneous other products are hardened, uniformly, scale-free and continuously in **EF** electric and fuel fired chain belt conveyor furnaces similar to the above. Built in sizes to handle from 300 to 1700 lbs. per hour.

Send for circulars showing these and other types of E F Production Furnaces

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production